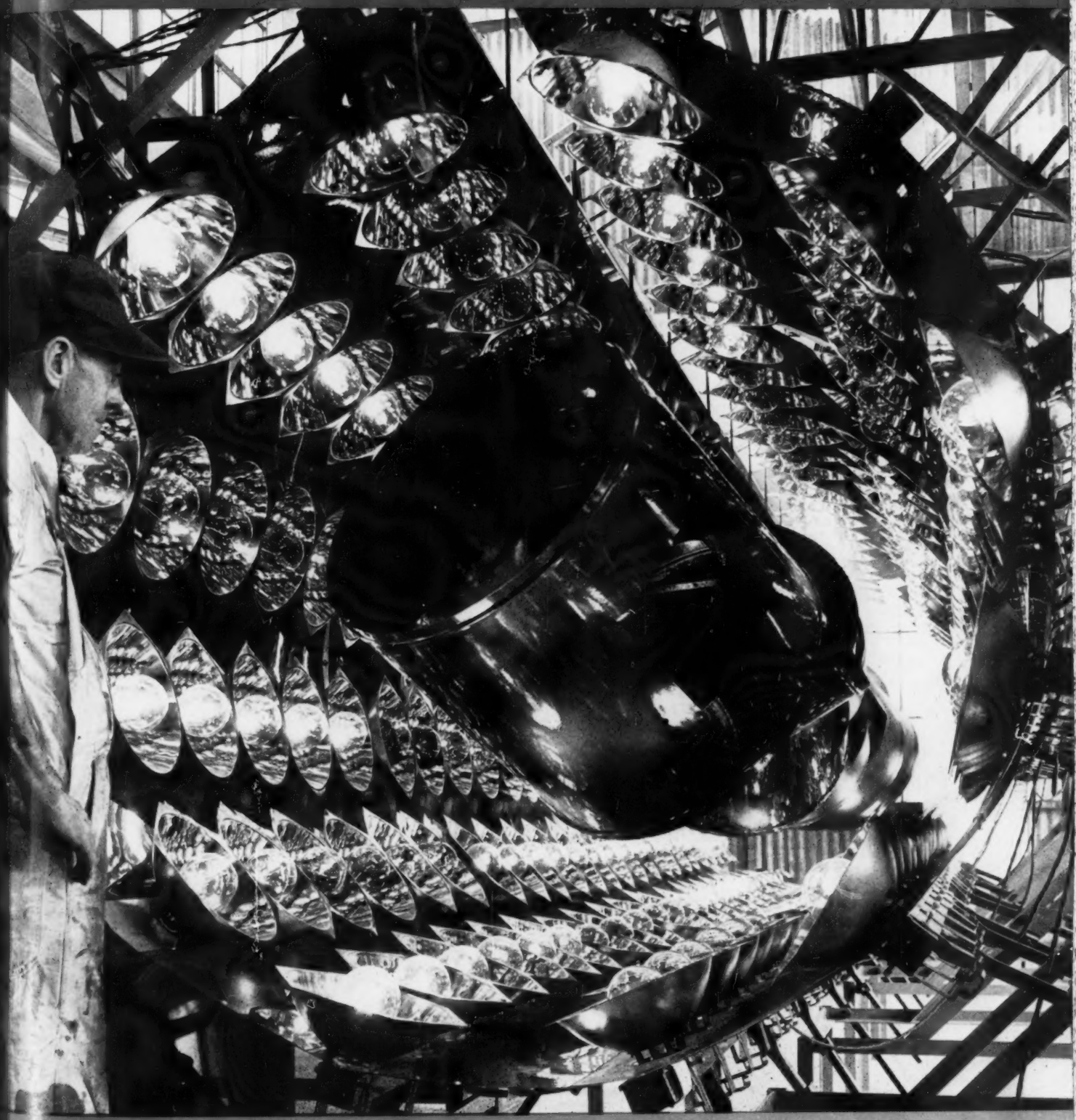
ELECTRICAL WEST

THE ALL-INDUSTRY MAGAZINE OF PROGRESS



GRAW-HILL CO.
F CALIFORNIA

JULY, 1941

25c a Copy

Up and up AND UP

GO ELECTRIC ROASTER SALES

Cool off your kitchen with an
ELECTRIC ROASTER
IT ROASTS, BAKES, BROILS, FRIES!
Here's Cool, Easy Cooking For Every Meal Everywhere
Try it Free IN YOUR OWN HOME
Now as low as $3 DOWN

king is a breeze with a modern
ELECTRIC ROASTER
TRY IT Free
For Home, Cabin or Trailer
Now as low as $3 DOWN
AT YOUR DEALER OR
SOUTHERN CALIFORNIA EDISON COMPANY LTD.

Treat yourself to cool, Easy Cooking with an
ELECTRIC ROASTER
USE IT ANYWHERE
Free TRIAL OFFER
Now as low as $3 DOWN
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SOUTHERN CALIFORNIA EDISON COMPANY LTD.

Take a Vacation from Hot Cooking with a modern
"Cooks an entire meal at one time"
ELECTRIC ROASTER
Free TRIAL OFFER IN YOUR OWN HOME
Now as low as $3 DOWN

★ Sales of electric roasters continue to skyrocket. Recent national figures show a 62.36% increase over the first three months of 1940. Boost YOUR summer profits with this fast-selling appliance. Timely Edison advertising in newspapers, and by direct mail, helps make your roaster merchandising easier and more profitable.

SOUTHERN CALIFORNIA Edison

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), July, 1941. Vol. 87, No. 1. Published monthly by the McGraw-Hill Company of California, 68 Post Street, San Francisco, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rate in U. S. and U. S. possessions, and Canada, $2 per year; all other countries $3 gold (thirteen shillings). Single copy 25c.
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THE MOTOR YOU ASKED FOR IS STRONG ON PROTECTION

New G-E TRI-CLAD MOTOR

1

Extra Protection

AGAINST PHYSICAL DAMAGE

A truly modern motor must withstand accidental blows, flying chips, dripping liquids, and occasional bumps in moving or mounting. We built the Tri-Clad motor to meet such threats of damage!

We made the frame and end shields of cast iron, using channel and rib sections for strength without excessive weight or bulk; we cast the sturdy, rigid feet integrally with the frame. We completely enclosed the upper portion and carefully baffled all ventilating openings to protect vital motor parts. The bearings have dust-tight cast-iron housings. And the finishing touch—we gave the motor a tough coat of paint to protect against rust and corrosion.

The Tri-Clad motor is fully protected against the accidental ill-treatment some motors encounter all the time, and which *all* motors encounter some of the time. As a safeguard against production interruptions, as a prime factor in lowering costs, this new motor means extra profit protection, too.

Make your next induction motors Tri-Clad. General Electric, Schenectady, N.Y.

"BUILT FOR PROTECTION FIRST . . . . . TO LAST"

2

Extra Protection

AGAINST ELECTRICAL BREAKDOWN

New stator windings of Formex wire give extra protection internally against moisture, oil, abrasion, and heat aging. New synthetic impregnating and protecting varnishes make a rigid unit with a hard finish.

3

Extra Protection

AGAINST OPERATING WEAR AND TEAR

Sleeve bearings of new design have long life and great load capacity because of new proportions and oil distributing system. The one-piece cast-aluminum rotor winding, with fans cast integrally, is practicaily indestructible.

GENERAL ELECTRIC

Here in the WEST

People

L. O. Trim

has had an unusual opportunity to see defense industry grow right under his eyes as chief electrical inspector of Burbank, Calif., (p. 25) where airplane factories and factories making parts for them have sprung up so rapidly. Before becoming electrical inspector he was on Boulder dam construction, another big job.

H. Garfinkel

is one of the best known finance men serving the electrical industry in the West. His initial experience in electrical equipment financing was with a Seattle bank. For the past several years he has been connected with General Electric Contracts Corp. in various executive capacities. Previous to becoming manager of its western district, comprising 11 western states with headquarters in San Francisco, he managed Northwest operations and later the southern California and Arizona territories, from Los Angeles. (p. 37).

W. C. Mullendore

executive vice president, Southern California Edison Co., hardly needs an introduction to ELECTRICAL WEST readers. (p. 23).

Preview

Underground

distribution is in constant demand in many communities. More of the downtown distribution systems in small cities, by necessity and for public relations reasons, are being run underground. Next month a symposium on underground practices found to be most economical by one large utility on the Pacific Coast will be published for the guidance of other utilities facing the same problems.

Fluorescent

trouble-shooting is not always easy but a practical method for the man in the field, contractor, electrician or maintenance man, has been worked up and will be explained in the next issue. Told to classes of union electricians by the Northern California Electrical Bureau engineers, it was received as a genuinely practical field test procedure.

Temporary

power for use during construction of buildings or any project is desirable, but it is also dangerous unless proper precautions are taken in its service and use. Diagrams of such installations that meet safety standards will be printed in next month's pages.

Incandescent Lamps

need to be sold to fill the empty sockets before winter darkness returns. Sales ideas for light conditioning will be the theme of the August SALES GUIDE, early because it is well to plan for fall merchandising of lamps early this year. These are times when everyone has need to live cheerfully, and better light helps that.

Pages

Progress and the Electrical Industry 23
By W. C. MULLENDORE—Not by equipment alone must the services of the electrical industry be kept alive, alert and efficient.

Defense Wiring 25
By L. O. TRIM—What the basic wiring system of any large defense plant requires.

Fundamentals of Coordinating Fuses and Relays .. 30
By R. M. WILSON and C. E. CANNON—Solution of a problem for the provision of protection of lines.

Appliance Credit—What About It 37
By H. GARFINKEL—Dealers and distributors need to think about the long term, low payment business in these peculiar times.

Infra-red in the West 42
New applications in which special design to fit the product was developed.

New Products 6
Bulletins, etc. 14
Electra's Husband 20
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Sales Guide 33
Sales 37
Lighting and Wiring 42
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Associations 50
News 55

Cover photograph by Douglas White, Southern California Edison Co., of infra-red oven at Thermador plant in Los Angeles. (See Page 42.)

LEADERSHIP IN ACTION SCORES ANOTHER ALL-TIME RECORD!

...In just 6 months of 1941
Frigidaire Dealers sold and delivered

Over ONE-HALF MILLION
FRIGIDAIRE REFRIGERATORS!

DEFINITE PROOF OF...

- ✔ Leadership in Public Preference!
- ✔ Leadership in Productive Capacity!
- ✔ Leadership in Retail Selling!

More than Ever it pays to...

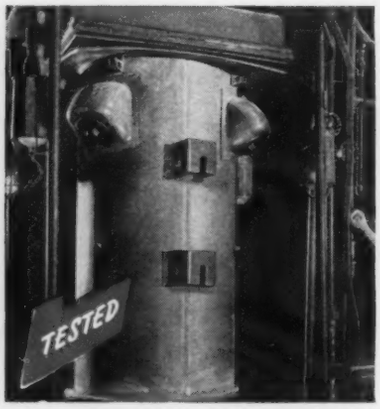
FRIGIDAIRE ELECTRIC REFRIGERATORS
RANGES AND WATER HEATERS

SELL THE FAVORITE-
SELL FRIGIDAIRE

Frigidaire Division, General Motors Sales Corporation, Dayton, Ohio

REASONS WHY ENGINEERS CHOOSE THE NEW

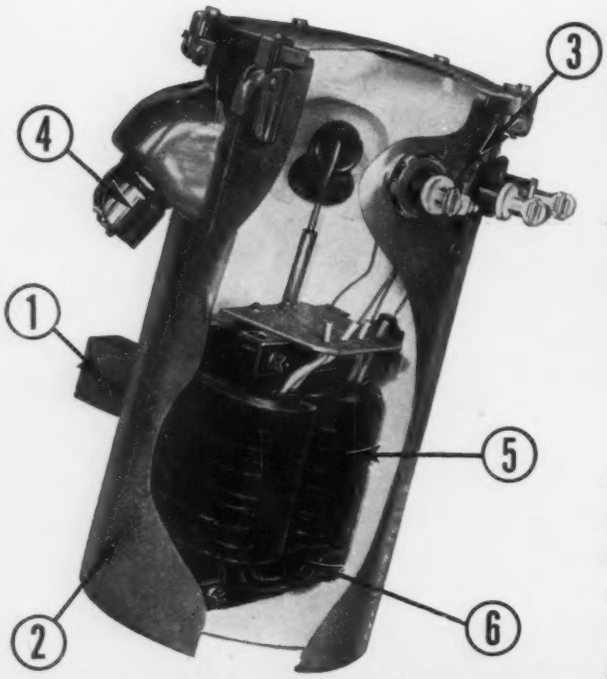
1 Simplified Supports for Direct Pole Mounting Cut Installation Time. Standard Support Spacing and Bushing Location Mean Complete Interchangeability of All Sizes and Makes.



2 New, Durable, Copper-Bearing Steel Tanks. Tested Under Pressures Far Greater than Normal . . . Prevent Oil Leakage, Assure Long Life and Complete Safety.

3 New Spra-bonderizing Process . . . Plus Triple Coat Automobile Finish Give Tanks Positive Four-way Protection Against Attacks of Rust and Corrosion.

"Money-Saving



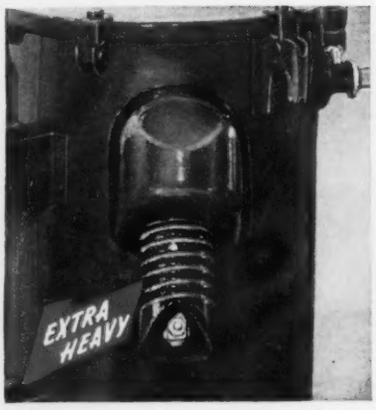
"YES! And There's a Lot More to this New, Easily-Installed Allis-Chalmers Distribution Transformer . . . with Its Six Big Engineering Features!"

If that's what *you* are looking for in the distribution transformers you buy, you'll *find* it in the new Allis-Chalmers Distribution Transformer with six big engineering features!

Here's a transformer design that's based on the actual field experience of hundreds of operating men

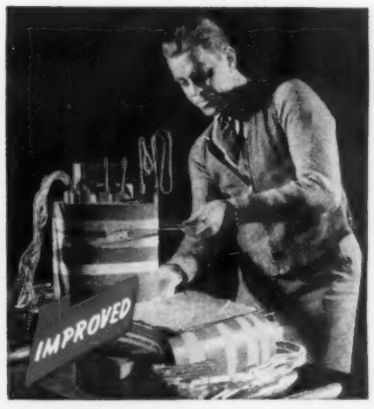
ALLIS-CHALMERS DISTRIBUTION

ALLIS-CHALMERS DISTRIBUTION TRANSFORMER



4 Extra-heavy Porcelain Coordinated Bushings with Liberal Creepage Offer Maximum Reliability Under Fog, Dust, Chemical or Other Adverse Conditions.

5 Double Conductor Insulation... Flexible Enameled Wire... Plus the Added Protection of Well-Lapped Cable Paper Provide Double Safety Against Winding Failures.



6 Improved Core and Coils, Liberally Designed with No Manufacturing Short Cuts . . . Mean Extra Years of Service-free Performance Under All Types of Operating Demands.

Operation?"

all over the country . . . a transformer that makes your specifying and buying easier . . . saves you both time and money!

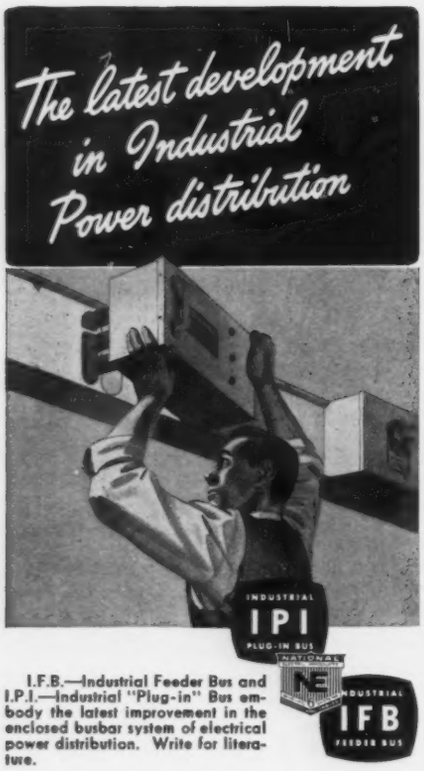
Because the location of supports and bushings are standardized, all sizes and makes are completely interchangeable. Deliveries are faster . . . installation easier . . . there are fewer parts and fewer complete units for you to handle in stock.

But that's only part of the story! Look at the photographs across the top of the page. They tell why you get a *plus* value when you get the new Allis-Chalmers Distribution Transformer. Advanced engineering . . . plus the best material and skilled workmanship . . . give you built-in quality second to none!

Bulletin B-6159 gives complete engineering information on the new Allis-Chalmers EEI-NEMA Distribution Transformer. Write for your copy . . . *today!* Allis-Chalmers Mfg. Co., Milwaukee, Wis.

A-1407

TRANSFORMERS *Cut Operating Costs*



I.F.B.—Industrial Feeder Bus and I.P.I.—Industrial "Plug-in" Bus embody the latest improvement in the enclosed busbar system of electrical power distribution. Write for literature.

National Electric
PRODUCTS CORPORATION
Pittsburgh, Pa.

4 x 4 Wirewa may be mounted direct to the wall. No projecting brackets necessary. Quick and easy to install couplings. Only two bolts to tighten. Quick access to the full length of wireway. Investigate—Write for literature.

National Electric
PRODUCTS CORPORATION
Pittsburgh, Pa.

PRODUCTS
that are news

Hotel Broilers (700)

A line of hotel and kitchen size broilers has been announced by Edison-Hotpoint Co. Equipped with interchangeable Calrod heating unit assemblies, front and rear, the special sheathed construction permits rapid transmission of heat, while protecting the resistance wire from oxidation or mechanical injury. The broiler is of the sectional type and may be used as a single section for counter-mounting or assembled in a 1-section boiler with oven or as a double-section broiler with oven. To provide flexibility and economical use of current, each of the two heating units within the broiling compartment is independently controlled by an indicating, reversible, 3-heat switch. Each heating unit assembly is divided into two sections and each is rated at 2.5 kw. (10 kw. total rating). All the new broilers are produced in standard voltages only, for operation on alternating current, single or three-phase.

Kitchen Fan (701)

Signal Electric Mfg. Co. has developed an automatic lever-operated shutter for its line of kitchen wall box vent fans. Other attributes, according to the company, include totally enclosed motor, rubber mounting for motor, 10-in. quiet type fan, telescopic adjustment for wall thickness from 6 in. to 24 in., detachable plug, cast iron outside frame with baked enamel finish, inside door for extra weather protection and opening and closing of the door with handle starts and stops the motor and also opens and closes the shutters.

Sputterless F Starter (702)

Hygrade Sylvania Corp. has developed a new fluorescent lamp starter, the "Mirastat," made available to the trade in three sizes. The number 2 is designed for use with 15 and 20-watt fluorescent lamps; the No. 4 for use with 30- and 40-watt lamps; and the No. 6 for use with 100-watt lamps. Improvements claimed for this patented starter include elimination of "sputtering," due to proper preheating of lamp cathodes; retardment of blackening at the end of lamps; longer lamp life; and definite, accurately-timed starting and re-starting. Wattage consumed is approximately ¼ watt. Starter circuit includes a condenser design to minimize radio interference.

Hard Lamp (703)

Radiant Lamp Corp. announces a high-wattage lamp that will permit increase of illumination up to 250% without fixture change. Use of a hard glass bulb makes it possible to reduce size of a 500-watt lamp to that of a 200-watt lamp and also permits it to withstand thermal shocks when used outdoors. The new lamp was originally designed for use in explosion-proof fixtures. In place of the large "mogul" screw base and heavy fixture necessary to support the weight of an ordinary 500-watt lamp, the new lamp can use a medium screw base. Other size industrial lamps up to 10,000 watts are now being made to meet special requirements of various industries.

New F Lampholders (704)

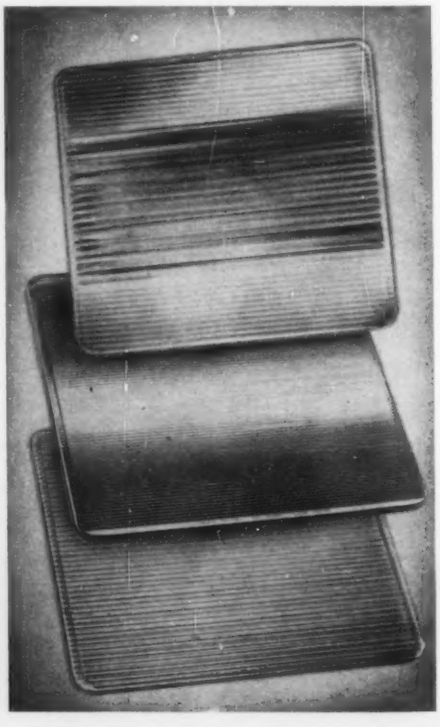
New combination lamp-holders, starter sockets, and starters for T-17 100-watt fluorescent lamps for making easier replacement and greater holding power have been announced by General Electric Appliance and Merchandise Dept. Included in the equipment are combination lamp-holders and starter sockets, single lampholders, combination lampholders with inverted starter sockets, 4-contact separate starter sockets, and 4-contact Mazda lamp starters. The lampholders are of the rotating lock type and are available with or without mounting brackets.

Twin Lamp Industrial (705)

An open-end twin lamp luminaire, utilizing the 100-watt, 60-in., white or daylight fluorescent lamp, designed especially for high-level illumination in industrial plants is announced by Westinghouse Electric & Mfg. Co. This 2-FP-100 luminaire meets RLM specifications; is applicable to installations requiring high mounting heights; and is available for operation on 110-125, 199-216, and 220-250 volts, 60-cycle a.c. The units consist of a hood, reflector, lamp holders, starting device, and ballast equipment. Two reflector types provide a choice between totally direct and diffused, or semi-direct illumination.

Fluorescent Controlens (706)

Three new products developed by Holophane Co., Inc., bring distinct light control to a fluorescent lamp, according to the manufacturers. The first, known as the Intensive Controlens, produces the distribution of light used in commercial and industrial interiors, a uniform spacing of horizontal surfaces in rooms of normal height. Second is the Concentrating Controlens, which produces a rigidly confined focusing type of light distribution. Third is the Extensive Controlens, which is adapted to areas where the lighting of vertical surfaces is desired. These prismatic glass lenses, when used with fluorescent fixtures, meet high optical design specifications, according to the Holophane Co.

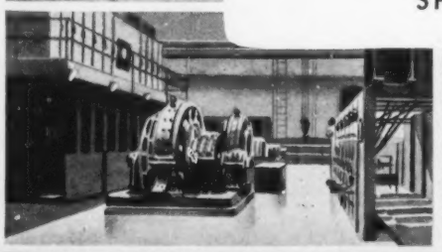


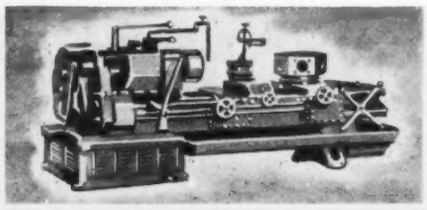
Contributes to dependable performance

● Good commutation is one of the most important factors in obtaining dependable performance and minimum maintenance expense on commutating equipment. In the development, manufacture and application of "National" carbon brushes, special attention is given to the commutation requirements of the service for which each grade is designed. As a result, "National" brushes have achieved a reputation for outstanding commutating qualities.

National Carbon Company representatives are always ready to help solve your commutation problems. Write or wire to our nearest Branch Sales Office.

SPECIFY NATIONAL BRUSHES
TRADE-MARK





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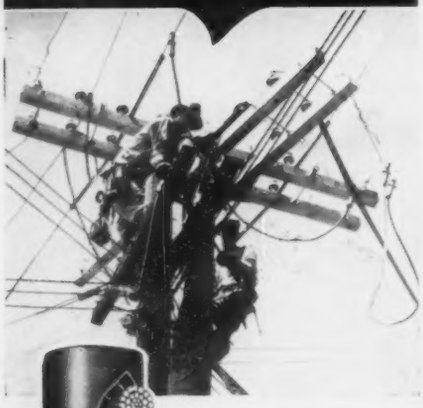
UCC

If you are not receiving these practical bulletins on brush operation send us your name and address.

"They're the safest, most practical clamps we've used"



Ask the men who use them, about TIPS JUMPER CLAMPS

They'll say they like the corrugated rubber handle because it provides an extra firm grip for easy control and tight contacts. They like the simple easy method of attaching cable. They appreciate the fact that all metal parts except the open jaws are covered with insulation and that the hand guard not only prevents them from getting too close but also reduces surface creepage. They can be assured that Tips jumper clamps are safe. The tough rubber or fiber insulation has a breakdown point in excess of 6,000 volts.

The photograph above shows the rubber insulated clamp with corrugated handle—overall length 9". At right is the same head with special hand guard and long fiber handle—overall length 16".

For more compiete information, consult your Tips Tool Catalog No. 8 or ask your jobber.

A·B·CHANCE CO. CENTRALIA MISSOURI

Combination Range (707)

Retaining the features of the Portland model (combination electric and fuel range), Landers, Frary & Clark presents in the Universal line the "Rocket" model which includes a full size 16x16x19-in. oven, single piece top and back splasher, and all 5-heat unit control. Features of the Rocket include the large oven with a baking unit of 2700 watts and broiling unit of 2500 watts; automatic control with signalite, balanced oven heat, counterbalanced door, sliding shelves, broiler pan, rotary reversible switches and appliance outlet on switch panel.

ABC Portable Ironer (708

Altorfer Bros., Co. is featuring in its 1941 line an ABC portable electric ironer. This ironer has 3½-in. diameter roll, 22-in. long; made of non-warping, rustproof metal, covered with compressed cotton padding. It is equipped with thermostatic heat control marked for ironing various materials, and has a manual-type pressure control lever, double open ends for easier ironing. The unit has 1,200-watt 115-volt nichrome heating element; 115-volt condenser motor operates on 50 or 60 cycle current. Base of the ironer is one-piece deep-drawn steel finished in white. Ironer head mechanism is precision built and can be carried or stored in any position except upside down. Overall measurements are the length of 28½ in., height 11 in. and width

Floor Model Vacuum (709)

Two new items on the Premier Vacuum Cleaner Co. 1941 lists are a low-priced floor model 42 and the hand cleaner model 52. The floor model is designed in maroon and gray with the colors of the bag matching the crinkle finish on the machine. An important innovation on this model is the new Simple-Matic nozzle which requires no adjustment to clean rugs and carpets of varying thicknesses. The hand cleaner has a Hi-power motor, ball bearings, which also powers the motor-driven brush.

Portable Floor Fan (710)

A 36-in. heavy duty portable floor fan is offered by ILG Electric Ventilating Co. The 36-in. heavy duty model weighs 675 lb., contains 1140 rpm, and circulates air at a rate of 24,000 cu. ft. per min. Overall height is 67 in. and guard diameter is 43 in. with a base diameter of 32 in.

Once You use 25 of these

Modern Kearney Trip-O-Link Fuse Switches—Available 5000 to 69,000 Volts 50 and 75 Amperes

You'll Re-order 25 More

KEARNEY TRIP-O-LINK FUSE SWITCHES

IT'S been happening right along for more than four years now.

Once an operating man puts a group of Kearney Trip-O-Link Fuse Switches into service—notes their exceptional performance—considers their low cost and trouble-free maintenance—he invariably re-orders more.

Really, this is not an idle claim.

Any operating man who has tried these switches will tell you how they give maximum protection at surprisingly low cost.

So do this: place a trial order today. Test these Trip-O-Link Switches any way you see fit.

Order 25 of these switches. See if you, too, won't be ordering more, very soon, to take immediate advantage of the savings you effect. Ask a West Coast Kearney Representative. Maydwell & Hartzell, Inc., San Francisco, Los Angeles and Portland.

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. U.S.A.

The Mark of Quality Products

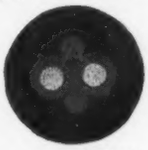
UTILITY EQUIPMENT for BETTER Construction

Draws its Power Through

OKOCORD ELECTRIC MAGNET CABLE

SPECIFICATIONS

Okocord Electric Magnet Cable for 77" C-H Magnet



No. of Conductors
Two
Size of Conductor
#1 Awg, 427 strands
Conductor Insulation
5/64" Okonite rubber
Fillers
Rubber with cotton binder
Sheath
11/64" Okocord 60% rubber with tire-cord reinforcing
Outside diameter
1.415"

This 77-inch magnet with its tremendous lifting capacity was manufactured by Cutler-Hammer, Inc., Milwaukee, Wis., for Columbia Transportation Company, an affiliate of Oglebay Norton & Company, and is installed on the steamer O.S. McFarland, where it greatly reduces handling time.

As with all magnet cables, flexibility and extraordinary resistance to wear were primary considerations in the design and construction of the Okocord cable, one of the largest flexible cables ever built, through which flows the 230 Volt — 115 ampere power supply for the magnet.

Like all Okocord cables, the 60% Up-River Fine Para rubber jacket, vulcanized under pressure in a continuous metal mold, has a tensile strength of over 3500 lbs. per square inch and forms a rugged, flexible, smooth and snag-proof covering which guarantees long service.

THE OKONITE COMPANY Passaic, New Jersey

Offices in principal cities

OKOCORD OKONITE **RUBBER-SHEATHED PORTABLE CABLES**

For Better Service-
INSTALL
TRICO
REG. U.S. PAT. OFF.
RENEWABLE FUSES
With the famous Powder-Packed Element
KLIPLOK CLAMPS
Lock fuses and clips together
KANTARK FUSES
With genuine fibre tubes (not paper)
COLORTOP PLUG FUSES
The color tells the size
FUSE PULLERS
Pull and replace fuses safely
OILERS
Glass and Unbreakable types for every application. Stops guesswork - bearing failures - waste - idle machinery, etc,
WRITE FOR FOLDER No. 300
TRICO FUSE MFG. CO., Milwaukee, Wis.
M. L. Woodard, 367 9th St., San Francisco
W. E. Young Co., 1944 Broadway, Denver

Light Hedge Trimmer (711)

L. J. Kaufman Manufacturing Co. has developed a portable electric hedge trimmer, in two models, the smaller, with a total weight of 3¼ lbs., being equipped with a Universal motor for operation on d.c. or a.c. current, 32, 110 or 220 volts as specified, 1/40 hp. A feature of the "Hedge Master" is the operation of the knives. It has two moving knives that are reciprocating in action. The larger model is powered by a 1/20-hp. Universal motor with an 18-in. handle that permits operator to reach across hedges and trim without stooping. Net weight is 6¼ lb.

Welding Rectifier (712)

Designed especially for supplying required d.c. currents to magnetic energy-storage type spot welders such as are used for joining aluminum in the aircraft industry, a new ignitron spot welding rectifier is announced by the Westinghouse Electric & Mfg. Co. The new rectifiers are available in two capacities, one for use with 40 kw., the other for 120-kw. spot welders. Each rectifier will operate two welders if they are sequenced so that only one can be loaded on to the rectifier at a time. Rectifier consists of a control and protective panel, power transformer, and ignitron power tube all contained in a forced ventilated floor mounted sheet metal cabinet with a heavy welded H-frame. Tubes are arranged for water cooling, and cooling is controlled by a thermostatic water flow switch.

Outlet Box Adapter (713)

Wiremold Co. has produced a ceiling outlet box adaptor for suspending Wiremold fluorescent units and Wiremold No. 3000 fluorescent channel from existing outlets. Canopy has twist-outs for standard Wiremold 200, 500 and 700 raceway. Also, a new receptacle cover fitting is now available for mounting standard 50-amp. "twistlock" industrial receptacles in No. 3000 Wiremold raceway as part of a complete power outlet system for industrial use.

Pothead Cutout Combined (714)

G & W Electric Specialty Co. has available a new type "FCVX" unit combining cable pothead and oil fuse cutouts on a welded steel box for attachment to transformers. The oil fuse cutouts are gang operated to serve as a 3-pole full load oil switch, as well as fuses. A complete metal clad unit construction prevents mechanical damage to interconnecting wiring.

BUSINESS FIRMS
Save Time and money
BANKING WITH US
BY MAIL

Nine out of every ten banking transactions should take no more effort than is needed to mail a letter. That's why more and more neighborhood merchants, business and professional people are using our Mail Service. We supply special envelopes and forms which make banking by mail easy and safe.

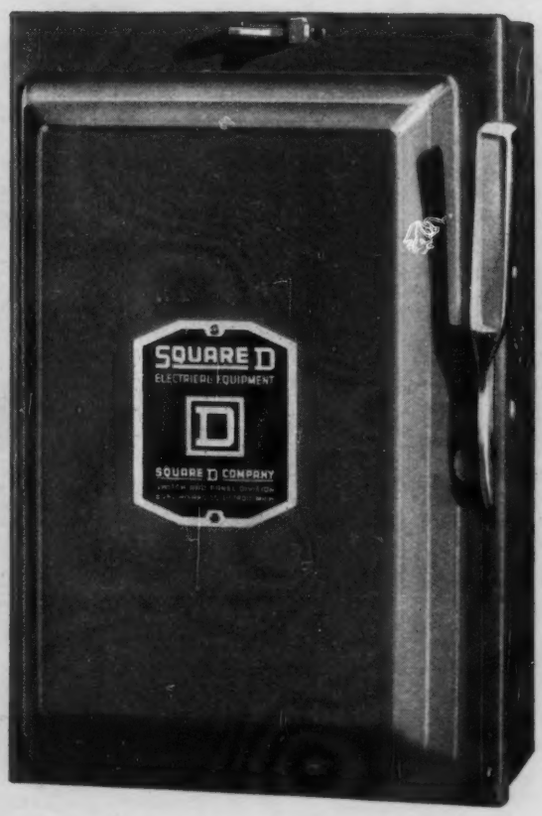
Write for information today.

CROCKER FIRST NATIONAL BANK
OF SAN FRANCISCO
California's Oldest National Bank
Member Federal Deposit Insurance Corporation

STRENGTH, ruggedness and durability are combined with definite economy in *Crapo* Galvanized Steel Strand. Low first cost, low maintenance expense are matters of record wherever this time-tested product is in use. Available in all standard grades and sizes from representative jobbers throughout the country. Or, write—

INDIANA STEEL & WIRE CO.
MUNCIE, : : INDIANA

SQUARE D
SAFETY SWITCHES
. . . Everywhere



SQUARE D pioneered in the development of the Safety Switch. Today it is difficult to walk far in any direction without seeing the familiar [D] emblem on safety switches and other electrical equipment.

There is a SQUARE D safety switch to meet every modern requirement. The hundreds of thousands now on duty tell a convincing story of their dependability.

SQUARE D COMPANY

LOS ANGELES - MILWAUKEE - DETROIT

IN CANADA: SQUARE D COMPANY CANADA LIMITED, TORONTO, ONTARIO

GE metal-clad switchgear

1 ***"Four weeks? Fine! That'll give us time to get the cables in."***

2 **There it is, all ready for you to roll it into place and connect the cables—right when you need it.**

NOW shipped in 4 weeks

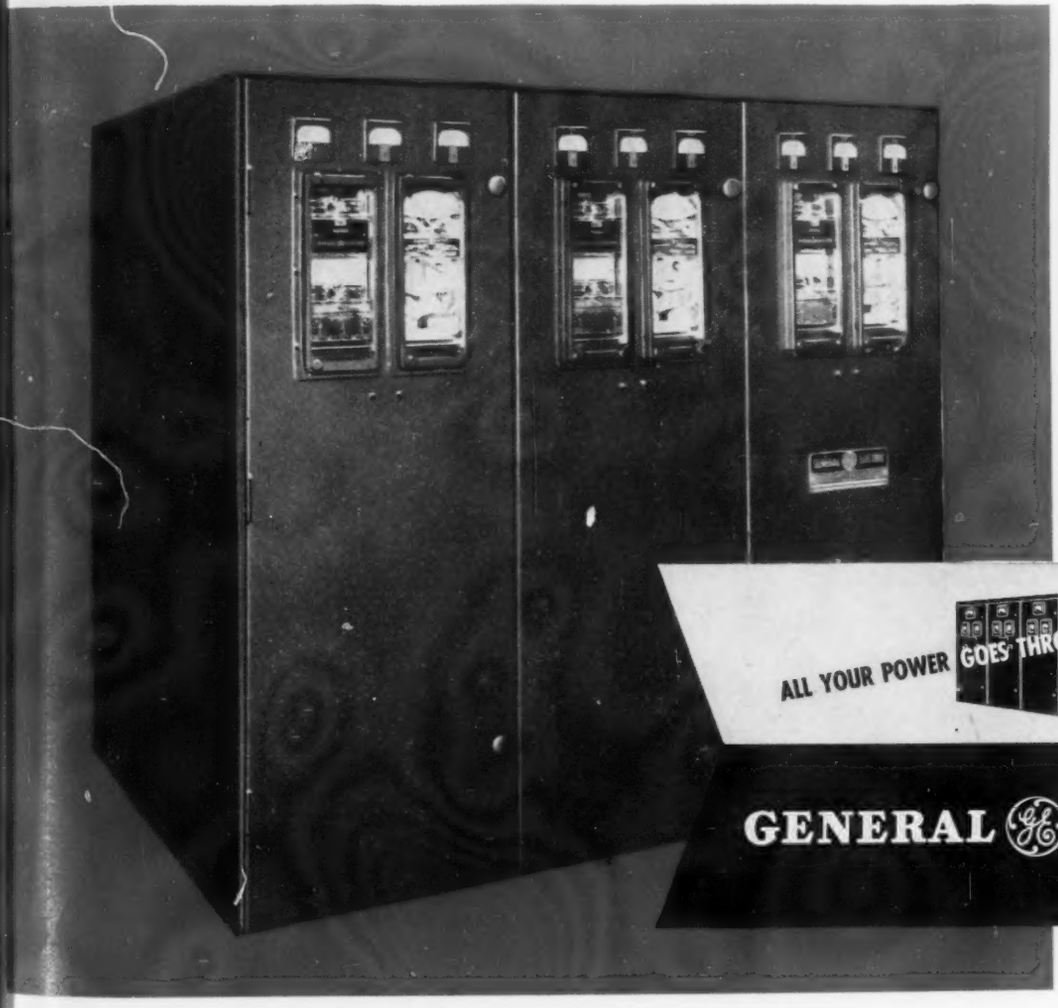
(INSTEAD OF SEVERAL MONTHS)

THIS reduction in shipping time for low-capacity Type MI-9 metal-clad was made possible by standardizing units that *adequately* meet industry's requirements for incoming lines and feeder circuits (up to 2300 volts).

This is a real contribution of our Switchgear Division to the defense production lines of America. Last year their contribution was a 25 per cent reduction in the price of these small and medium-sized metal-clad units.

Now you can get the finest switchgear built—completely factory-assembled—all ready to be bolted down and have the cables connected, utterly safe and dependable, at bed-rock prices because of standardization, and all this in new record-breaking time.

All your power goes through your switchgear. Haven't you some obsolete gear that should be replaced today? Talk to your G-E salesman. General Electric, Schenectady, N. Y.



3

Power's on! Months saved, and you have a completely co-ordinated, factory-tested, dependable equipment.

ALL YOUR POWER GOES THROUGH YOUR SWITCHGEAR

Play Safe with G-E METAL CLAD

GENERAL ELECTRIC

854-13-7300

KLEIN BELTS MEAN *SAFETY*

"Since 1857"

WHEN you're up on a 50-foot stick with nothing but air between you and the ground, it's good to know that the belt you rely on carries the Klein trademark. Only the finest material goes into Klein belts—only drop-forged Dee rings and buckles designed to take 1500 pounds are good enough. Safety engineers—linemen everywhere—know that their safety record—yes, life itself—can be trusted to Klein.

Your copy of the Klein Pocket Tool Guide will be sent on request.

ASK YOUR SUPPLIER

Foreign Distributor:

International Standard Electric Corp., New York

Mathias **KLEIN** & Sons

Established 1857 — Chicago, Ill. U.S.A.

3200 Belmont Avenue, Chicago, Illinois

BULLETINS

data books, etc.

Heavy Switchgear (715)

Heavy duty metal-clad switchgear for use in steel mills, industrial plants, substations, etc., is described in a 15-page bulletin produced by Westinghouse Electric and Mfg. Co. These units are rated at 600, 1,200, 2,000 and 3,000 amp. for service up to 15,000 volts with interrupting capacities between 1,000 and 500,000 kva. General information and distinctive features common to all units are discussed. Both indoor and outdoor types are completely described, attention being given to housing, control devices, elevating mechanism and oil circuit breakers. Ratings and physical dimensions are tabulated and photographs illustrate the text. Data 32-160.

Steatite Standards (716)

National Electrical Manufacturers Assn. announces the release of a new publication entitled "NEMA Steatite Electric Insulation Standards". The handbook contains standards on dimensions and tolerances for Steatite glazed and unglazed posts, tubes, rods, bars, plates, cups, bushings and lead-in insulators. Price is 10 cents.

Enclosed Disconnects (717)

Enclosed disconnect switches for distribution systems are described in a new bulletin by Schweitzer & Conrad, Inc. Numerous illustrations are used to show the construction features such as the multi-finger contacts and truss blade assembly of the Type ES switch, rated 7.5/12.5 kv., 200-600 amperes. Information and illustrations are also included on Type ESL, 100 to 200 ampere, 5000-volt porcelain switch, and a wood-housed type of 400 ampere capacity for 5000-volt service.

Oil Burner Motors (718)

Emerson Electric Mfg. Co. describes its line of oil burner motors in a new bulletin displaying various models, together with specifications and construction detail. Motor performance curves are shown in graphs, and dimensional data are completely told in a scale drawing. Index: B580: A120.0(M), Unit No. X3941.

Distribution Transformers (719)

Allis-Chalmers Mfg. Co. announces a new bulletin on standard distribution transformers that meet all recommendations in the first report of the EEI-NEMA joint committee on transformer standards. Fifteen well-illustrated pages cover the design and construction, as well as dimensions, price lists, and electrical data for sizes of 1½ kva. to 25 kva. for standard voltages of 2400 to 13,200 inclusive.

A-C Wathhour Meters (720)

Describing a.c. watthour meters, including singlephase, single-disk, 2, 2½, and 3 element; meter and time-switch combinations; maximum demand registers; and accessories, a new 48-page bulletin has been issued by the Sangamo Electric Co. Designing and construction details are described and illustrated. Views of assembled and disassembled component parts of meters, such as driving elements, grid assemblies, registers and bearing systems are shown. The booklet contains connection diagrams, outlines dimensions, and specifications and prices of the complete Sangamo a.c. meter line.

Heavy Switchgear (721)

Pacific Electric Mfg. Corp. has available a new bulletin on its type YSW switches, 7.5 to 115 kv. These switches include single, double, and triple-pole units, rotating insulator, single horizontal side break. Photographs of the switches and views of actual installation supplement a complete description of the advantages of the YSW products. A schedule of ratings and dimensions complete the presentation.

EASY WAY TO GET INFORMATION

To keep posted, simply circle the items in which you are interested, cut out the coupon (it can be pasted on the back of a postcard) and mail to:

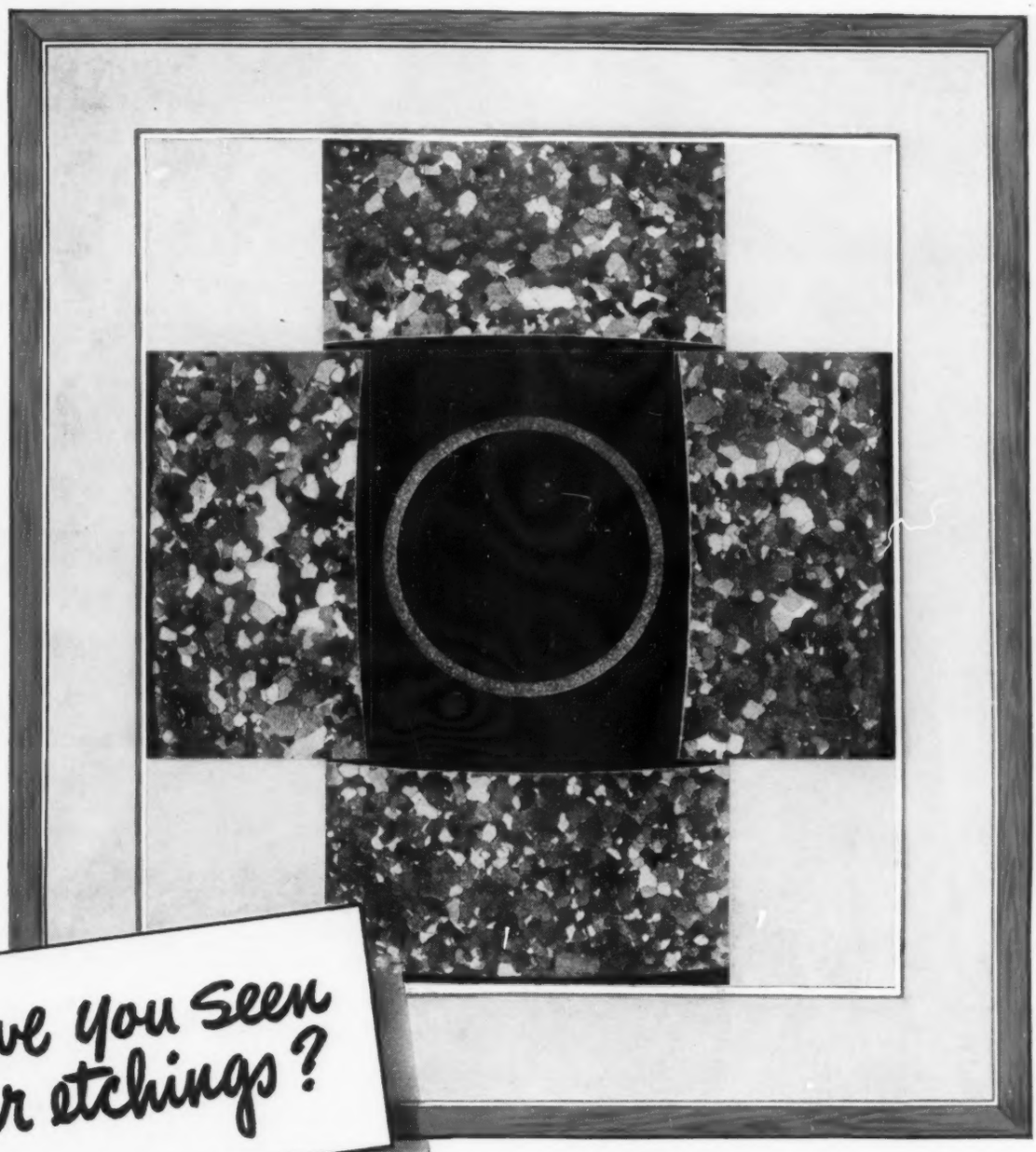
ELECTRICAL WEST, 68 Post St., San Francisco, California
Please send me the following CIRCLED items:

700	701	702	703	704	705	706	707	708	709	710
711	712	713	714	715	716	717	718	719	720	721

Name..... Company*..... Title*.....

Address

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.



Have you seen our etchings?

Polished etchings of copper-lead tube cross-sections magnified 15 diameters. Note uniformity throughout the entire structure.

No double entendre is implied in our question, for these etchings aren't made to adorn bachelor walls—collectors turn up their noses at them. But, to you—that's different. To you they are priceless because they help make the quality and efficiency of Anaconda lead sheathed cable *unbeatable*.

By etching samples of lead and then examining them under the microscope, Anaconda engineers can actually see whether the sheath is perfect enough to be used in Anaconda cable. And in this guardian capacity, they see ways to make improvements.

This kind of research gives all Anaconda wires and cables an unmistakable identity. When you see the Anaconda trademark, you know, *because we proved it*, that the product bearing it is of the highest quality available.

Anaconda Wire and Cable Company

General Offices: 25 Broadway, New York City.
Chicago Office: 20 North Wacker Drive.
A subsidiary of Anaconda Copper Mining Co.
Sales Offices in Principal Cities.

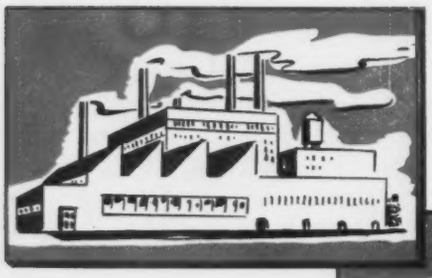
ANACONDA
from mine to consumer
REG. U.S. PAT. OFF.

This familiar trademark identifies Anaconda products. It symbolizes the best efforts of man and science.

41384

Use Modern Improved

ANACONDA WIRE & CABLE



FOR WIRING ALL TYPES OF BUILDINGS

Use

G-E HIGH QUALITY WIRING MATERIALS

You'll find exactly the wiring materials you want in the G-E line for wiring any sort of building. The line is complete. G-E wiring materials are made to be used together and are designed for easy installation.

G-E conduit is easy to bend, threads are accurate, interior finishes are smooth. G-E BX and BraidX can be stripped quickly. G-E building wire is clean stripping and easy pulling. G-E wiring devices have large binding screws, wide mounting ears, etc.

G-E wiring materials are made from the finest raw materials obtainable. Your customers will be pleased with long, trouble-free service they give.

For further information see the nearest G-E Merchandise Distributor or write to Section CDW-1187, Appliance and Merchandise Department, General Electric Company, Bridgeport, Conn.

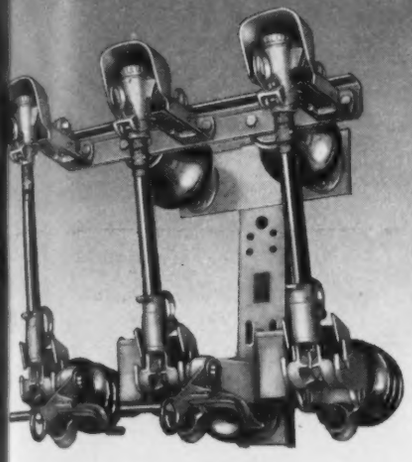
ELECTRIC - - 12 R 600 V - - CODE GRADE
CTRIC - - 12 RP 600 V - - PERFORMANCE GRADE
CTRIC - - 12 RH 600 V - - HEAT RESISTANT GRADE
- - 12 RW 600 V - - MOISTURE RESISTANT GRADE

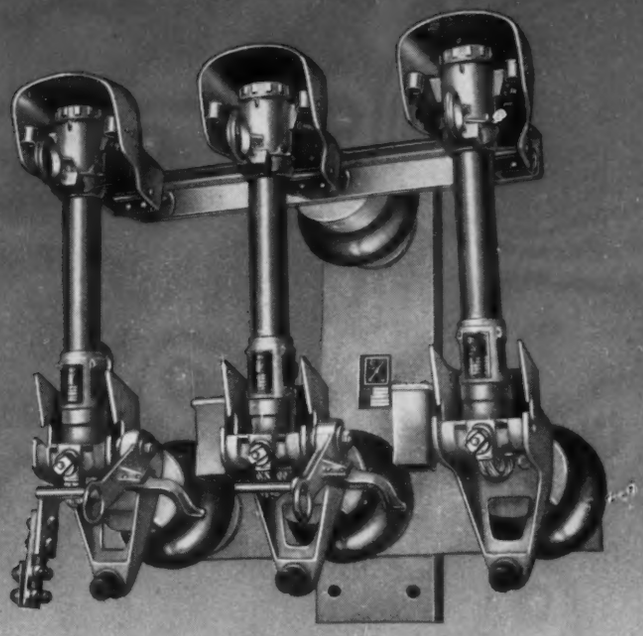
ADEQUATE WIRING SERVES AND SAVES

G-E HOME WIRING
provides completely adequate wiring for residences. Write for a bulletin.

GENERAL ELECTRIC

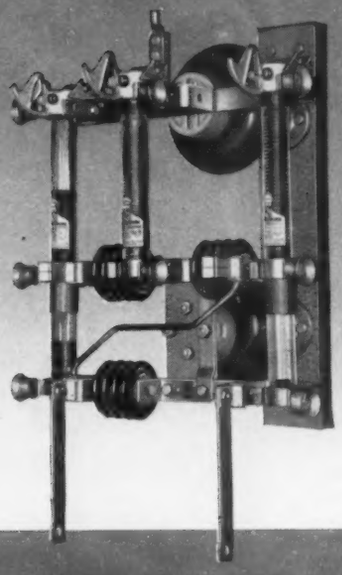
Below: Semafor MRSO 100-Ampere three-fuse Recloser, 5000 to 46,000 Volts.—Uses Universal S & C Fuse Links.





Heavy Duty Semafor HRSO 200 Amp., three-fuse Recloser, 5000 to 46,000 Volts.—Uses field replaceable Fuse Units.

Below: S & C Loadgard Reclosing Liquid Fuses made in ampere ratings to 200, in voltage ratings up to 46,000.



MAKE SURE YOUR COMPANY RANKS HIGH IN "CONTINUITY OF SERVICE"

● The plants served by your company depend on you to keep important production up to maximum.

Your steps to guard against outages must not only be reliable—but naturally should be as low as possible in initial and maintenance costs.

For quick service restoration after faults, and to reduce extra service call expenses,—S & C Reclosing Fuse Equipment is used on many of the country's finest systems.

S & C Reclosing Fuses are made in a wide range of types and ratings up to 200 amperes, 46,000 volts,—with interrupting ratings up to 10,000 r.m.s. amperes.

Don't overlook this means of insuring maximum *continuity of service.* Make a survey of your power customers. Install S & C Reclosers now to save outage troubles and expense. Write for our Bulletin 215-A, "Fuse Cutouts and Reclosers."

SCHWEITZER & CONRAD, INC., 4435 Ravenswood Ave., Chicago, Ill.

Manufactured in Canada by Powerlite Devices Ltd., Toronto, Ontario

RECLOSING FUSE EQUIPMENT

WESTERN REPRESENTATIVES:

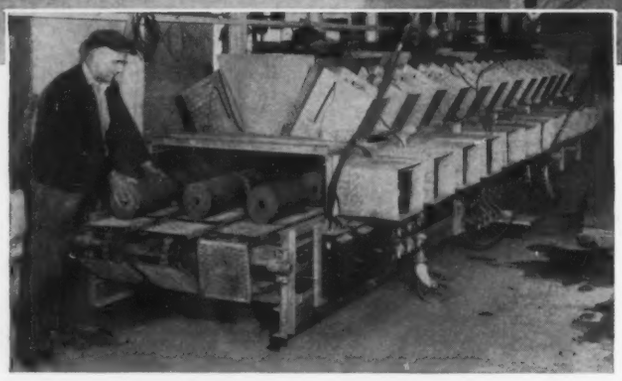
SAN FRANCISCO
George E. Honn, 420 Market Street

LOS ANGELES
Farnham & Cunningham, Edison Bldg.

SEATTLE
T. S. Wood, 220 Ninth Avenue, North

SALT LAKE CITY
Riter Engineering Co., Kearns Bldg.

FIRST AGAIN!



A Victor Discovery of Utmost Importance to the Entire Electrical Industry . . . . . .

Realizing that the Sun was the best dryer of clay from time immemorial Victor Engineers decided to control its action to avoid the uncertainty of all the trying delays and losses prior to forming and firing porcelain.

We developed the answer—two infra-red units, which are now operating on a regular production line. They automatically control the moisture content and the speed of drying of our clay preparatory to firing.

This development is of great importance to the entire industry because—

Strains which usually show up on Thermal tests are avoided. ★ Accuracy of Dimensions is assured. ★ Production is speeded up by definite drying time control. ★ Uniformity of Porcelain Quality is assured. ★ Actual record cases show 6 days from clay bin to shipping room door. ★ Use of Infra-Red Rays is an electrical load builder. ★ Saves Fuel by eliminating steam coils.

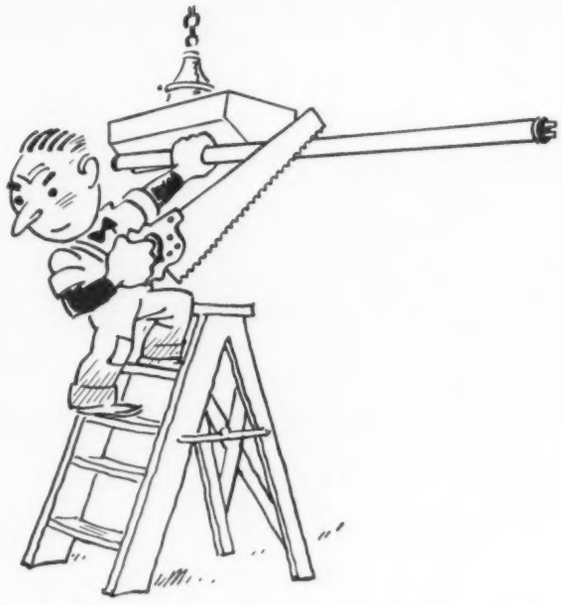
V *The Mark of a* **GOOD** *Insulator*

VICTOR INSULATORS, INC.
VICTOR, NEW YORK

SAN FRANCISCO PORTLAND — MAYDWELL & HARTZELL INCORPORATED — LOS ANGELES PHOENIX

Engineers & Manufacturers' Representatives

"It's no use, Ed, that long F Lamp won't fit that 20-Watt Fixture!"



HERE'S a joint problem . . . yours and ours . . . to see that good fluorescent lighting installations are made in the first place. This man's 20-watt fixture, though good, just wasn't big enough for the job. Unfortunately, right now he can't put in a larger lamp to get the light he needs. Too many businesses have installed fluorescent lighting just to cut the electric bill. Not enough of them have been sold on engineered lighting or the amount of light they need in order to produce maximum profits.

HERE'S WHAT 100 MERCHANTS SAID

In a recent survey, 100 store owners were asked, "If you were improving the lighting in your store, how much more light do you think you ought to have?" With average present lighting of around 10 footcandles, a quarter of them said, "No more," and only one ventured as high as 30 footcandles. None seemed to think that 50 footcandles or more were necessary. This, despite the fact that progressive merchants who know the close relationship between light and selling are making sales increases directly traceable to their higher level light installations.

WHO WILL TELL THEM THE FACTS?

Lighting company representatives constitute the only group large enough in number, who know the facts about lighting, and who can spend the time to tell the story of better lighting and its advantages to the average store and average industrial plant. This group is the hope of the lighting industry in helping contractors, fixture salesmen, and distributors' men, locally, to spread the gospel of the need for selling engineered lighting, and to tell the facts about increasing sales and producing fewer rejects, less spoilage, and better morale.

G.E. HAS HELPS TO HELP YOU

To help utility men sell the higher lighting levels needed, General Electric now has available several new sales tools including:

1 G-E Footcandle Selectometer—a device which the customer operates himself to determine how many footcandles he would like to have for proper seeing.

2 A sales presentation easel and sales manual—with pictures, short copy, and sales ideas; to be used by the salesman talking either commercial or industrial lighting.

3 The Seeing Spinner that demonstrates how good lighting speeds seeing.

4 A visibility meter or seeing selector which provides a means for demonstrating to the customer how good light makes seeing easier and quicker.

IN ADDITION, General Electric has slide films, booklets, direct mail pieces, and a manual of ideas—detailed suggestions for planning and carrying out a complete industrial and commercial lighting program. For complete information, see your General Electric lamp representative. General Electric Company, Nela Park, Cleveland, Ohio.

G-E MAZDA LAMPS *Made to stay brighter longer*

GENERAL ELECTRIC

HAVE YOU JOINED *the 49-er club?* **SEE YOUR G-E LAMP REPRESENTATIVE!**

ELECTRA'S HUSBAND

Labor Fable

ONCE upon a time there was an Underdog, and it was known as Labor. It was a poor, underprivileged Underdog, often mangy and full of woes. Sometimes it went hungry and it was kicked around a lot by men and boys alike. It never had much of a place in the sun. Occasionally it growled and snapped as if to Strike, but a lot of people paid no attention, thinking its bark was worse than its bite.

Some people felt sorry for the Underdog and tried to cure its mange and get it something better to eat and a better place to sleep. They even felt that if it were treated right and trained a little it might become the real pet of the family. Of course that sort of treatment was slow and took time, but they had hope of its ultimate benefit to the Underdog.

The poor Underdog was often infested with fleas. These fleas made its life pretty miserable, for not only did they live off of the Underdog, sucking his blood, but they stung him and made him mad. A lot of times it looked for all the world as if these fleas were foreign and Communistic. That is, they thought that anybody's meat was theirs too.

On the whole, though, this Underdog was getting better breaks and was less mangy and better fed and had a better place to sleep than the Underdogs in any other land. He rode in automobiles and slept in a house and you'd think he owned the place sometimes, which was all right with most everybody because they liked the way he was improving.

Hard times came along and there wasn't much food for the Underdog or anybody else, and he got a bad case of the jeeps. As he wandered around a lot in search of a meal the fleas flocked back on him and bit the devil out of him. They made him hard to get along with and he was snappish at anybody, even his friends.

Then one day there came to the land a Great Man and a whole flock of fresh boys. Fresh out of school they were, and full of fun and ideas, which sometimes they laughingly called Ideology. Among these ideas was one that anybody who had anything must be a stinker. How else could he get it when they had never been able to get any themselves to speak of, except from the old man. Of course they didn't stop to think that you don't get things by sitting around talking about it. But it was such fun to talk.

When these boys saw the poor bedraggled Underdog they thought they'd have a little fun with him. They whistled nicely to him to come close. They fed him a little. But darned if they didn't tie a can to his tail when they saw an Employer go by and told the Underdog to go "sic 'im." "Go get that Employer, the dirty so and so," they yelled at the Underdog, and being full of flea bites and with a can tied to his tail he just had to go bite somebody, so off he went.

Some of these Employers the Underdog would just Strike any old place. Some he would get in the seat of the pants, making it a Sit Down Strike.

And the Great Man just sat back in his big chair and smiled an inscrutable smile, and the little boys thought it was more fun than a bullfight.

Well the Underdog tasted blood and liked it. It made him feel strong. He strutted around now instead of slinking. He grew bold and fierce, and at his very growl many Employers went scurrying hell bent and threw him all the meat they had if he asked for it. The Underdog got bigger and more arrogant and had the run of the land. Pretty soon he thought he was the Top-dog.

Then along came a big dogfight overseas, the noise of which could be heard over on this side. There the dogs of war were at it so hard that one pack, bred almost into wolves again, threatened to swim the stream when they got through with the English Bulldog and take on all comers. The Great Man and his boys became worried. They called a National Emergency. They needed lots of everything in a hurry. They told the Employers to quit doing whatever they were doing and go into all-out production, no matter what it cost or who paid.

Speeches were made at the Top-dog too, asking him to be a nice-dog as long as he'd had his fun and was well again. Just from habit, of course, these speeches called Employers names, which the Top-dog took to mean, "keep on with the sic 'im."

Darned if the foolish Top-dog didn't keep biting away at the Employers just the same. At first the Great Man and the boys just told the Top-dog to "please not." But the Top-dog had a taste of power and couldn't hear. He wanted more raw meat. The more the Employer tried to work the harder the bite.

Then the boys got worried. They even started looking for fleas themselves. A little while back they had laughed at the idea of fleas hurting a dog. "Why," they said merrily, "that's just so he would know he's an Underdog. *You* must have put the fleas on him *yourself*." But it was different now.

The boys even said the fleas must be Communists.

"Please not" didn't work. The Top-dog just kept on Striking. He *liked* it. Made him feel so powerful, so feared. What a sensation!

Then even the Great Man with his soothing voice asked them nicely to lay off. But no success. He began to be a little irritated himself. He talked more sternly. Still the Top-dog paid no attention.

That was too much. Something would have to be done about it. The boys went into a huddle. They made speeches. They issued warnings. They even passed a resolution. Boy, that would get the Underdog down, a resolution! It fairly bristled with whereases and ended up with three rousing "be it further resolveds."

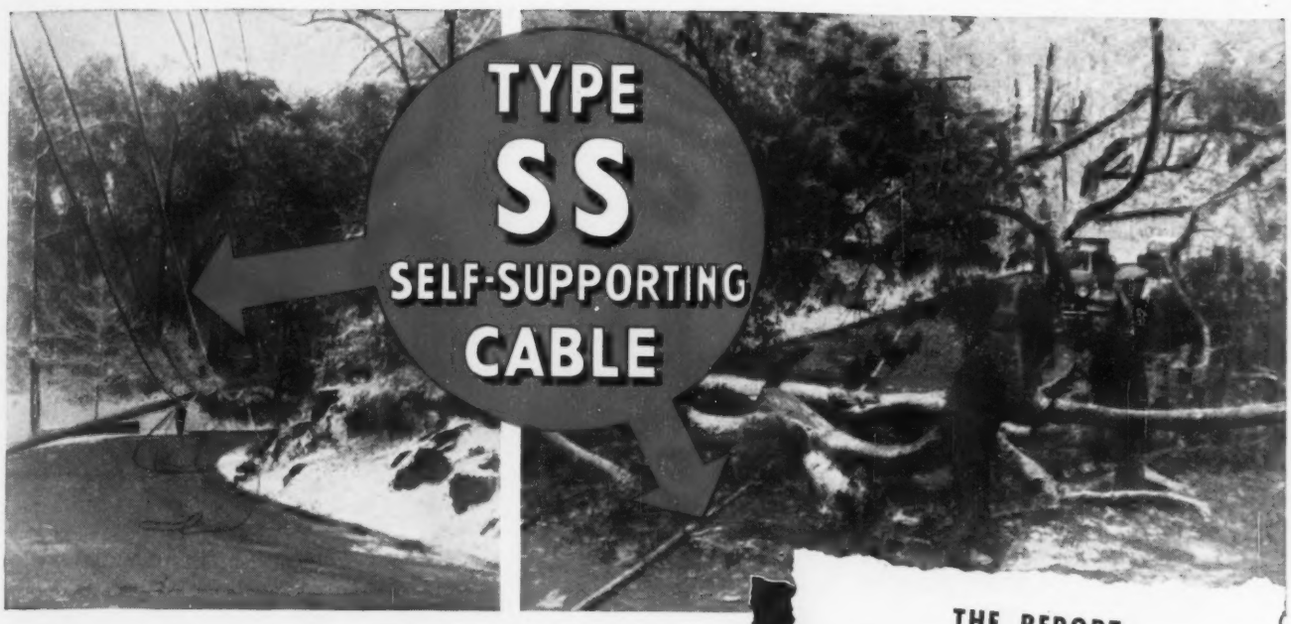
At which the Top-dog, full of fleas now and hungry for more raw meat, just went on Striking and Striking. The Employers, the seat of their pants eaten out long ago and hardly a leg left to stand on, finally told the Great Man and his boys that they couldn't turn out the stuff unless the Top-dog behaved. So the boys said, "*We'll* take over production," feigning reluctance but thinking all the time they could do it better than the older heads who had been running industry for so long.

But just as they got ready, darned if the Top-dog didn't Strike against them too, because they smelled just like Employers then.

So they had to call out the Poundmaster and his helpers who threatened to shoot the Top-dog or at least lock him up unless he tended to business.

* * *

Moral: When you go to feeding an Underdog *raw* meat, look out for your hand.



UNDAMAGED

It Picked Up the Load!

HERE'S the report of an experience with Type SS aerial cable which again proves its ability to support service under snow, sleet, or high wind. Even when down with trees or poles across it as shown in the pictures!

Type SS makes possible these important advantages:

Long spans or use of short poles—or both.

Freedom from short circuits if in contact with trees or wires—thus there's little danger of shock or injury.

Practically no tree trimming necessary—therefore right of way is easier to obtain. The cable presents a better appearance than messenger-wire cable.

These and other advantages make Type SS the most economical choice for many types of urban, suburban, and rural circuits.

For power circuits. The two-conductor type serves single-phase circuits, with one side grounded, from 4000 to 15,000 volts. The four-conductor type is for three-phase, four-wire circuits, up to 5000 volts. The insulation is No. 1799 varnished cambric. A ground conductor is in the outer covering.

For control circuits. The multiple-conductor type is for telephone, supervisory, or other control circuits, of 300-volt rating, from 4 to 10 conductors. Thinwol, a General Electric compound of 85 per cent new rubber, is the insulation. The armor is used only for support and mechanical protection.

Have you seen our new Type SS bulletin? The number is GEA-2408A. Get a copy from the nearest G-E office. General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

501 3 1200

THE REPORT

(Digested from the power company's own account.)

Following hours of snowfall, during which we had aerial line trouble from over-weighted trees and limbs, a very large tree crashed, taking with it our three-phase aerial wire, two street-light wires, two telephone cables and messengers, and one newly installed 2/0 SS cable. Wires, SS cable, and cross-arms were stripped from the pole on the substation end of the span where the tree fell, and two poles were broken off beyond the span. Because of the electrical set-up at the time of fault, the circuit tripped, but after cutting clear the main aerial open-wire trouble, the circuit was re-energized and the SS cable picked up the load just thirty-four minutes after the initial interruption.

The SS cable was later returned to its proper position without showing any evidence of what had occurred other than the newly installed poles.

Our experience in installation and operation of the cable leads us to believe that we were correct in our design assumptions, and that the cable will do all that is expected of it.

ACCEPTANCE

Following is a summary of the orders placed by three representative power companies during the period 1936-40.

Company	Number of Repeat Orders	Total Feet Purchased
A (East)	9	170,000
B (Middle West)	11	56,500
C (Far West)	3	23,200

GraybaR GEARS ITS SERVICE TO THE GROWTH OF THE WEST

Ten GRAYBAR offices are now serving the Pacific States as a part of GRAYBAR'S long-time policy to give full-scale service *locally* in meeting electrical needs. From 1902, when the first Pacific Coast house was opened in San Francisco, through 1936, when Sacramento and San Diego were added to complete the present list, the growth in personnel and distribution facilities has been geared to the continued expansion in West Coast industry and commerce.

Thus, today, when exceptional demands are taxing the ability of all, GRAYBAR is "on deck" and well prepared. The specialized needs of its customers are known to local GRAYBAR Representatives, and wherever possible, GRAYBAR stocks are being adjusted to anticipate their future requirements. GRAYBAR customers have learned that they can count on time-saving help in estimating, in ordering and . . . so far as humanly possible . . . in delivery.

Furthermore, GRAYBAR Representatives know that your *future* good-will is as important as your present orders to the long-range principle of local service on which GRAYBAR has built its business. Vitally concerned with *your* tomorrow, they are individually striving to serve you best today. Whatever your electrical needs, GRAYBAR is prepared to serve you.

GraybaR IN OVER 80 PRINCIPAL CITIES • *Executive Offices:* GRAYBAR BLDG., N. Y.

ELECTRICAL WEST

VOL. 87 NO. 1
JULY 1941

Progress and the Electrical Industry

★

As great as its responsibility to keep its plants running, its services and products available, is the industry's responsibility to keep our country safe and to combat the wild forces, within and without, that would destroy it.

By W. C. Mullendore
Executive Vice-president, Southern California Edison Co.

WITHOUT attempting any detailed examination of the earlier steps in progress, we may say that roughly in proportion as man learned to utilize and control the forces of nature, human and otherwise, he made progress toward betterment of his condition by freeing himself from the threats of starvation, disease, and (dare we mention it?) war.

The greatest single step in modern progress, as is now generally believed, was made in about the seventeenth century. Prior to that time, while mankind had made many discoveries of how to bring natural forces to his aid, such discoveries had been made largely by accident and without any widespread appreciation of the momentous fact that the forces of nature operate according to universal laws. That is, man had felt that he was largely at the mercy of inscrutable and unknowable forces which held him at their mercy, and his chief reliance for protection against the destructive application of these forces was his appeasement of the God or gods who controlled them.

In the seventeenth century and particularly with the discoveries of Newton and Galileo, the knowledge began to spread that the forces of Nature were not necessarily unkind or inimical to human beings, but that these forces operated according to fixed and immutable laws—laws which man might, through patient and painstaking study, learn to understand and to comply with. Thus was born modern experimental science devoted to the discovery of natural laws and how to comply with them to the end of controlling the natural forces and thus devoting them to the service of humanity. After that momentous discovery of the scientific method and as a result of it, came the development of mechanical power, and the rapid growth of the knowledge of man concerning the means of contributing to his material progress has increased cumulatively until, within the lifetime of our industry, we have seen an explosive advance in such progress, which surpasses all the advance heretofore made by man in hundreds of thousands of years.

We know that we in the United States in particular, and to a lesser extent the peoples of many other civilized countries, have discovered the key to material progress. The world has an ample supply of raw materials, science and invention have disclosed the means of combining these raw materials and even of fusing the elements into new and hitherto unknown materials such as plastics and new alloys. We know how to tap the all but unlimited sources of energy so that we are freed from the old dependence upon muscular energy. In short, there is now available sufficient raw material, sufficient energy and sufficient knowledge of how to apply that energy to raw materials so that the needs and to an ever-increasing degree, even the wants of mankind could be supplied. Why then are we not proceeding on the path of progress?

What is it that has happened to us that the civilized world is now filled with more uncertainty and dread, more unhappiness and terror than probably at any time since the barbarian hosts overran and destroyed the remains of the Roman Empire? In a word, is it not that while mankind has learned enough of the secrets of nature so that he can control the forces of nature, even to the control of climate itself, he has not learned to control himself? It is the destructive forces and passions of human nature which today threaten our civilization at the very moment when man had learned enough about complying with the laws of Nature outside himself that he was on the threshold of the Promised Land. It is as though the God of Destiny had shown us the possibilities of a life freed from many of the old fears and threats which menaced humanity, and then the gateway to that life is forced shut but the evil within man himself.

Some of us are trying to believe it is the war, and the terrible ideology of the Fascist and the Communist which are responsible for this threat to progress, this greatest menace to modern civilization, this crisis of all crises. But does that tell the whole story? Is it really true that this crisis is solely the result of the perverted desire of Hitler and his little band of highwaymen to dominate the world?

This personalizing of the obstacles to further immediate progress of civilization by attributing our troubles to a few perverted and evil leaders greatly over-simplifies our crisis. If we are to begin to understand the size and complexity of the threats to civilization we must not stop with condemnation of these leaders, but look behind them at the forces which made possible their accession to power. Mussolini, Hitler and Stalin may have seized power in part at least by force and in defiance of the will of the majority, but before that was possible, there had to be a

breakdown in the old order, a state of confusion brought about through divisions and internal conflicts between groups—strikes, interruptions of the production and exchange of goods and services, bankruptcy both private and public, inflation, agitation because of resulting increasing poverty, excessive taxation, futile attempts to distribute a dwindling and non-existent wealth, and finally, the increasing desperation of the people reaching the point where ruthless men with a plan which offered the restoration of order could seize power and dominate the people with police and military power.

In this hour of human history civilization is menaced not merely by the few dictators and aggressors who are trying to direct men and to use machines to the end of dominating other nations, but, much more perilous and terrifying, are the forces back of the leaders which were loosed by the agitation, the mismanagement and the disorganization which undermined the restraining dams in the years after the last world war and before the present one. There are those who seem to think that if only by some fortunate chance the dictators and their small gangs could be suddenly wiped out, or if by force of arms, we could crush them, peace and order could quickly be reestablished. But, important as the elimination of the leaders may be as a first step, such would be only a first and very short step in the solution of the much bigger problem of corralling, reorganizing and directing the forces of human nature again into the channels of peaceful pursuits, cooperation and order.

Neither must the equally important fact be overlooked that the same disintegrating forces which undermined the aggressor nations are operating and have been operating, in a lesser degree it is hoped, in the so-called democratic nations which are opposing the dictators. And as the war proceeds with its terrible strains upon and dislocations of normal life in every nation involved, the dangers from bankruptcy, concentration of power and mounting passions fed by war, increase for all.

What does all this have to do with "Progress and the Electric Industry?" Only this: Our progress and accomplishment are finally and wholly dependent upon continued peace and order within the society of which we are a part. We can preserve that which we and our predecessors have wrought and we can further improve and spread the benefits of our service only under conditions which permit men to work and to achieve.

We must then assume the continuation of those social, political and economic conditions under which we have thus far made progress, or, if this order is to be changed, the new order must afford opportunities for the exercise of the creative forces without which progress ceases. We cannot, therefore, in our discussion of the future, shut our eyes to the imminent threats from war and revolution which today surround us.

We can of course take the attitude that our job is merely to run our business, to build our plants and machinery and keep them in working order, to pay our taxes, and, if and when we are called, to serve in the armed forces; but that so far as political and economic questions outside of our industry are concerned, those are for someone else to worry about and to take care of. We are busy, yes. The demands upon our time from our regular work are greater than ever, yes. We are tired of hearing about war and calamity and taxes, and the temptation to bury ourselves in our daily tasks and let the rest of the world go hang are very great. Temporarily such an attitude may be the more comfortable one to adopt, but it is both perilous and shortsighted. We are not only members of the electrical industry. We are also citizens of a great country composed only of other common people like ourselves. The decisions which will determine the destiny of this nation, and hence of ourselves and our industry, will be made either by the few who think they know what they want, whether it be peace or war, a republic or a democracy, socialism or free enterprise, or these decisions will be made by all the people, ourselves included.

True we have a responsibility to do our job, to keep our plants running and our service available, but we have also a responsibility just as grave and vital, to keep our country safe, and to combat those evil and wild forces, both from within and without, which would destroy it, and with it our industry, and our progress. It is in such periods as the present that our thought, our intelligence and our abilities are needed on public questions more than at any other time.

Let me repeat, as pertinent here, something which I recently said elsewhere on the subject of defense as related to our future:

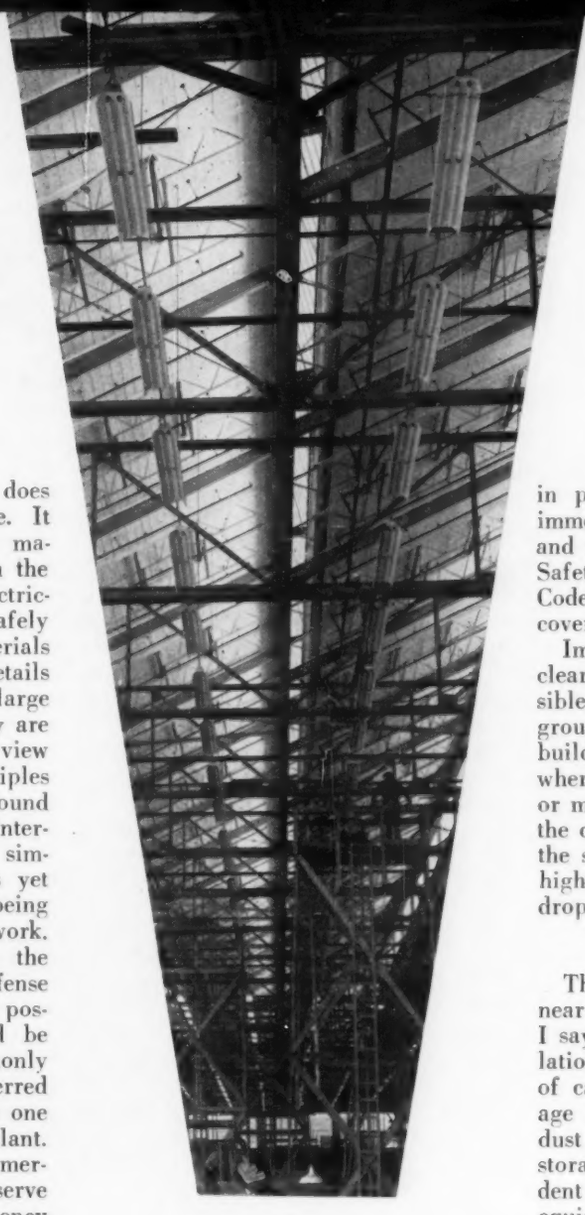
In our concern about policies and ideologies which threaten us from without, we dare not ignore the ever present danger of developing and nurturing these same policies and ideologies from within.

The essentials of defense require above all things else, that in attempting to save the world we do not destroy the essentials of American freedom. One of the greatest perils in our present pursuit of missions abroad is that we shall undertake more than we can perform, and in the exhaustion resulting from overtaxing our strength, fail both in our rescue mission and in the maintenance of our own republic. A false and foolish pride which prevents men and nations from recognizing the limit of their power and resources has led to many tragedies. We are now making very broad and generous promises of aid and assistance throughout the world to an extent which is perilously near to being foolhardy. To lead other peoples to rely upon aid which we cannot furnish is no kindness to them nor credit to us. We are responsible if we mislead others to their injury, and we alone can appraise accurately our ability and determine what is within our power to undertake and adequately perform. The role of hero requires not only boldness and courage but judgment as well.

The demands upon us from those to whom we have promised assistance will be unlimited. They cannot and will not limit their demands to those which are within our ability to meet. They are properly first concerned with their own salvation, just as we must be. It is therefore up to us to determine what we are able to do, and if we do not limit ourselves to that which we can perform without incurring insolvency or embracing the totalitarian state, we will have failed.

The revolving wheel of destiny has brought us into the midst of one of the great crises of civilization. Whether mankind goes backward or forward for decades to come depends in large measure upon our courage and our wisdom in this testing period. We are called upon to face grim facts, to endure hardships and make sacrifices far beyond any for which our generation has yet shown either the strength or capacity. If we awaken in time, if God grants us the wisdom to choose and the will to follow the difficult road of mutual trust and mutual sacrifice, we will emerge from this darkness into a brighter day in which we and our children can lead the world in the pursuit of a nobler and finer civilization. If we fail, another tragic ending will be written to another glorious chapter in humanity's upward striving. Let us believe and pray and strive to the end that all elements of our population, forsaking narrow selfishness, will have the vision to see and the strength to follow those converging paths which lead to the concentration of the full energy of a mighty nation of free people.

DEFENSE WIRING



Miles of lighting units are required to bring high levels of illumination for 24 hr. operation of vast defense manufacturing plants. Mounted near trusses of high ceilings, individual 4-lamp fluorescent units are plugged in. For maintenance the entire unit is replaced

By L. O. Trim

Chief Electrical Inspector

Burbank, Calif.

POWER for defense industry does not stop at the power house. It must be delivered to the machines and the lighting fixtures in the defense industries. There the electricity must be used efficiently and safely if it is to produce the defense materials and machines. While specific details of the wiring to and within the large plants engaged in defense industry are not considered wise to expose, in view of the emergency, the basic principles involved and the general methods found to be most practical may be of interest to others in the planning of similar facilities in newer industries yet to be built or old installations being enlarged to take on more defense work.

This distribution begins with the utility's own service to the defense plant. In this connection wherever possible the utility company should be required to provide what is commonly called a loop system with the preferred side of the loop serving only the one consumer, the large industrial plant. The other side of the loop or emergency circuit could be used to serve other loads provided a high frequency type of load drop and pick-up system is used, so that in case of a failure or outage on the preferred side of the loop, the load drop frequency could be impressed on the emergency circuit and all loads other than the industrial plant under consideration could be dropped until such time as the preferred lines and circuit are cleared.

The type of load on the emergency side of the loop should be given careful thought to ascertain that no other plant engaged in a business that acts as a material feeder to the larger or other plants working on articles of national defense is affected adversely, as the outage to it would be a weakening of a link in the chain of national defense production.

As an example of load that could be served by the emergency side of the loop, it should be confined to street lighting and small domestic loads. No good American would complain if he were to be without street lights or household electricity for a short period if he knew that the machines of national defense were still turning.

The voltage and type of the loop circuit is a factor that is given careful thought by the serving utilities. Their plans and specifications, in most cases, are very adequate and well engineered. In all cases they are more than willing to cooperate with the inspection authorities and plant engineers to provide the best system that is possible for the individual installation.

At the point that a service conductor or conductors of any type leave a right-of-way, grant or easement of a utility company and enter over, on, or in private property, these conductors immediately are subject to the rules and regulations of the State Electrical Safety Orders and National Electric Code, if no local ordinance more rigid covers the situation.

Immediately the first problem is clearance of the conductors over accessible areas and also horizontally from grounded and conducting materials, buildings and structures, especially where the circuit operates at 42.5 kv. or more. The terminating structures of the circuits should be as directly above the substation as possible to provide a high degree of vertical angle to the drops into the substation enclosure.

The Substation

The substation should be located as near as practical to the center of load. I say practical because on some installations hazardous conditions in the way of carbide generators, paint mix, storage and spray buildings, manganese dust and grindings, oil and gasoline storage exist and it would be imprudent to locate any possible arc-making equipment near such hazards. The transformers, protective and switching devices, to be discussed later, should be a minimum of 6 ft. from any building or structure, or such buildings are required to be of four-hour fire construction the full width of the enclosure, up to and including the fire wall. Where this will destroy natural light into a building, the 4 hr. wall should extend up to a point at least 3 ft. above the top of the transformers or bare live parts, and provided the top of the enclosure is screened and protected, 1-hr. fire glass mechanically set and glazed into non-opening steel sash can be used. This should also require a fenced area or passage way between the enclosure and the building to permit inspection, cleaning and renewal of the glass.

The concrete pad supporting the transformers in most places is engineered and designed by the utility company after a careful soil analysis, and in no case should it be less than 6 in. of reinforced concrete for up to three 100 kva.; nor less than 8 in. for three 200 to 500 kva.; nor less than 12 in. for 300 to 500 kva. and over. Space on the pad should be provided

for at least one spare transformer per bank.

The enclosure for an outdoor substation is required to be a substantial wire screen fence supported by not less than 1½-in. pipe structure. The minimum height for the fence must be 8 ft. If any current-carrying parts of the transformers or protective devices are over 8 ft. above the ground, then the minimum height must be 10 ft. A gate, large enough to permit the removing of the largest transformer possible to install on the pad, should be provided and kept locked in the closed position, accessible only to authorized persons of the serving utility company.

The size of the enclosure is governed by the size and type of equipment within it. There must be a minimum of 5 ft. of clearance between it and any of the current-carrying parts. The supporting rack for cable or bus insulators, switch gear, protective devices and metering equipment should in no case be a part of the enclosing structure, but should be a separate structure anchored securely in the concrete pad. The enclosure, especially if it is located any place that is subject to vehicular traffic, and it usually is in a large plant, should be provided with a very substantial guard rail, buffer rail, or blocking curb.

Grounding

The grounding network for a substation is very important, and particular care should be given to the installation to see that all connections are absolutely tight, compounded, and not of dissimilar metals. One of the best installations is to cast in the concrete of the pad a ground conductor not smaller than No. 4/0 bare connected to a ground well, designed and approved for the particular location regarding depth and materials. To this conductor, approved grounding spools are connected at points where the equipment will set. These spools are made of Everdur or brass metal and have a 2-in. square or round milled surface with a ½-in. taped hole, and a 4⅜-in. nut clamp which is connected to the ground conductor.

When installed they are adjusted so as to be cast in place, leaving the milled surface flush with the concrete. When the equipment is set in place it can be grounded easily and quickly by use of a short flexible jumper or bus bar which also can be disconnected quickly when removing equipment without danger of continual vibration or moving of equipment causing the ground conductor to harden and break. All transformer cases, supporting rack, enclosure, switch gear, and all non-current-carrying metal parts must be grounded to an approved equipment ground.

A separate ground must be installed for the secondaries of any transformers, connected so that one wire is common to one or more phases. This applies especially to high potential circuits such as 3-phase, 4-wire star 2,500/4,300 volt which cannot be grounded within a building, as the voltage is recommended to be limited to 150 volt to ground for interior wiring systems.

Each transformer, including small potential transformers used for metering, must be protected by an approved cutout, fuse, or circuit breaker, designed and installed to limit the current to that for which the transformer is designed to supply. All protective devices are to be provided with a disconnecting means which, if hook stick operated, shall be located at least 7 ft. 6 in. above the ground or floor.

The type, installation and location of metering equipment for high voltage substations is strictly the business of the utility company, and the inspector can feel assured that it will be adequately protected and located in a secure and safe manner. Usually the current is metered at the interior system voltage by watthour meters, but in larger plants consisting of groups of large buildings, the consumer has a high potential distribution system and then a demand type of rate and metering is commonly used.

From the utility substation distribution goes to the consumer's service. In a large plant this is usually a combination utility-consumer affair separated by an adequate barrier fence, and service is usually taken at 2,500/4,300 volt, 3-phase, 4-wire, as this is the most common transformation to meet the 5000 volt maximum entering a building. This service must terminate in an oil circuit breaker provided with disconnecting switches, overcurrent protection in each ungrounded leg, and with common trip. Closing and opening can either be electrical or mechanical as long as it is trip-free and visible, indicating whether it is open or closed. This requirement applies to high potential services 600 volt or over, and low potential services rated over 1,200 amp. With the high potential service the breaker usually protects a bus system, as the consumer not only has distribution from the point to consider, but also light and power to serve in the immediate vicinity.

The standard installation should be an interior vault and substation for the consumer using a group oil circuit breaker distribution board with removable truck type breakers to expedite maintenance and repairs. By using truck type breakers the disconnects may be omitted if the breaker is designed so that it cannot be removed in the closed position. Adjustable instantaneous type overcurrent relays with 90% load alarm can be provided and have worked out very satisfactorily. However, oil-filled cutouts are available for

Lighting units in this large spray room are mounted inside of vapor-proof housings connected by means of a duct system inside which the air pressure of duct and lighting units are higher than that in room. Any leakage therefore, will be outward

less than 5000 volt which are rated to be opened under load. These *must* be provided with disconnects if circuits operate at over 2,500 volt to ground, and give the required protection to high potential circuits and transformers.

It is possible to install oil-filled cutouts on multi-phase circuits so that they are gang-operated or so that they open all the ungrounded conductors simultaneously. Oil-filled cutouts should be grouped, marked, and isolated so as to make it impractical not to open all of them when de-energizing a circuit. The standard mounting height is 4 ft., as this permits a visual check on the oil, connections and ground. The best ground is to bolt the cutouts directly to a copper grounding bus bar which is part of the equipment ground. Oil-filled cutouts are not recommended because of their low short circuit interrupting capacity.

Extensive drafting rooms require high levels of illumination. Fluorescent units are finding widespread use. These are supported on pipe hangers from outlet boxes. In one plant all units were suspended on chains, with adjustable nuts against springs to support and level and reduced transmitted vibration

Feeders

If a high potential circuit feeds an interior wiring system containing motors or equipment other than transformers, then an oil circuit breaker with disconnecting switches is definitely required. However, I think a small section of bus on an oil circuit breaker board would be considered satisfactory as long as the bus could be disconnected by means of switches and all bus taps terminated in an oil circuit breaker approved for its location.

All conduit or raceway bends for high potential services and circuits must be made on a radius of at least 12 in. for each one inch of trade size, and extreme care must be taken to see that absolutely no foreign matter exists in any raceway or conduit, especially when lead-covered conductors are used. The lead sheathing must not contact any sharp edge or even be allowed to lie on the ground or floor. Huge gobs of cable grease or lubricant must be smeared on the sheathing to help in dragging all this heavy weight into place.

Since cable and wire manufacturers have been making rubber insulated products approved for wet locations, I have been urging their use and using as my arguments: (1) the elimination of the potheads, using common terminal fittings and sealing the raceways against excessive moisture only; (2) the use of standard radius bends, if necessary; (3) reduction, in most cases, of one or more trade sizes of conduit, for the same current-carrying capacity or conductor; (4) a tough, rugged insulation that will stand a lot of manhandling and rough treatment, especially since a neoprene sheath has been put on, making the conductors oil, gasoline and acid resisting; (5) while the price is practically the same as lead sheathed, the flexibility, weight and ease of handling and terminating make them much more practical. I believe these five points are well worth considering.

Remembering all the features discussed, it is well next to consider interior transformers with high voltage primaries. The primaries are not yet considered as service entrance conductors and for that reason rules governing service entrance equipment are not enforced. Oil-filled cutouts, oil or acid-filled fused disconnects or approved cutouts are acceptable as long as each transformer or bank has individual protection and disconnecting means, and voltage does not exceed 2,500 volt to ground. All devices so used must be plainly marked "DO NOT OPEN UNDER LOAD" and must be not over 6½ ft. above the floor; for oil cutouts, 7½ ft. minimum, if hook stick operated.

Cables must terminate in an approved manner and all conduits be sealed against moisture. All equipment must be grounded to an equipment ground, preferably as described.

The vaults, if required, are to be of 4-hr. fire construction, i.e., 6-in. reinforced concrete or 8-in. of brick or material of equivalent rating for floors, walls, and ceiling. The doors are required to be Class "A" fire doors provided with a sill or curb 4 in. high, or high enough to confine all the oil in the largest transformer. One square inch of ventilation is required for each kva. of transformers installed in it. To me this seems entirely inadequate. The vault should also have forced ventilation or air conditioning, thermostatically controlled. Motors, if in the vault, should be of a type designed to operate in high temperatures and with running protection set for 150% of its rating. When forced ventilation is used, the flues or ducts should run directly to the outside of the building and be in no way connected to any other vent system. No water piping, sprinkler system, ventilating duct or plumbing is permitted to be run through or in a transformer vault. The vault must be large enough to provide the necessary working clearances and a minimum of 12 in. around all transformers.

Non-inflammable Transformers

The tendency lately has been away from vaults and to transformers filled with non-inflammable liquids, especially where secondary loads are 150 kva. or less. Such loads include spot welders, large synchronous motors driving compressors, d.c. generators, and frequency changers. The location of this equipment in most places would mean long secondary feeds, and the construction of a vault is not only costly, but in present-day production would be a "sore thumb" in everyone's way.

This type of transformer can be installed on platforms up out of the way and where it is well ventilated. Protection and grounding are the same. The only other requirement is a metal pan, provided the platform is not fire resisting, and a guard rail and toe plate are provided.

A steel platform is always recommended, constructed of angles, channels and grate welded together as a unit. To this the transformers are securely bolted for earthquake and vibration protection.

Only when these transformers are located in an accessible area is guarding and screening necessary. There are no live or bare parts exposed and to my knowledge they are not made with a bushing or bus type connection but are designed and accepted for underground distribution systems.

Interior Wiring System

Now to consider interior wiring systems. Naturally the voltage is going to

be the highest at which the major part of the power equipment can operate. This is usually 460 to 480 volt.

Distribution switchboards for 460-volt should be designed to handle the maximum load of the feeders serving them. Usually not only are the power loads served, but in the majority of cases, 3-phase, 4-wire lighting is supplied at 460 volt by the use of 460/120 volt, single-phase, air-cooled transformers located and disconnected adjacent to lighting distribution panels, about which more is to follow.

When a current-carrying capacity of over 400 amp. is required to feed a switchboard, careful consideration should be given to the use of a bus installation.

Bare bus is acceptable under certain conditions, but the busway as manufactured by various companies is so much more practical that very little, if any, bare bus is or should be installed.

The busway provides a safe, flexible, easy-to-erect installation with nearly 100% salvage value. It is possible to provide a current range up to 4000 amp. The maximum voltage between buses must not exceed 600 volt, but at that, this represents a lot of horsepower watts, kva. lumens or what have you.

The power distribution switchboard should be provided with a circuit-breaker set to protect properly the switchboard busing and the feeder circuit. This is required if the rating of the feeder is over 1,200 amp. or if the transformers serving the switchboard serve any other switchboard or equipment. It is logical, as a failure of one circuit should at no time cause an interruption to other circuits of the feeder system.

The switchboard is usually of the dead-front, live-back type, screened so as not to be accessible and yet provide the minimum of clearance and working space. The subfeed switches are usually of the P K type, front and back operated, although a good many boards now are being constructed with circuit breakers, thereby taking advantage of the fact that they are capable of withstanding a momentary inrush of current greater than the rating of the circuit breaker. Likewise the size and space required are much smaller.

Additional breakers can be installed easily in a few moments in extra spaces and to busing that should be provided at the time of manufacture.

Types of Load

The types of loads served by distribution boards are very diversified, and it is not uncommon to see the full range of switch or breaker sizes installed on one board, from the heat-treating and annealing furnaces with 3-phase heating loads up to 1000 amp. per terminal, down to sensitive measuring and balancing devices rated in milliamperes. Motor generators for anodizing, synchronous motor-driven compressors, cranes and monorails, huge hydraulic presses and drop hammers, frequency changers, phase converters and current rectifiers, lathes, milling machines, drill presses with up to 32 rotating spindles per machine with a power panel and disconnect built on the machine, power panels protecting plugs for portable equipment and transformers for 3-phase, 4-wire 120/208-volt lighting. To describe all the equipment and apparatus used would fill a good-sized book, as the character of the different loads varies so greatly.

The high-current loads, especially where the voltage fluctuation is not too critical, are usually served with busways or heavy paralleled conductors, taking advantage of the 25 ft. tap rule and providing a fused disconnecting switch or breaker at or on the equipment or machine.

Care should be taken at this point to see that this disconnecting means is located not over 6 ft. 6 in. above the floor or platform, and that the conductors are at least one-third the current-carrying capacity of the subfeeder.

This system also works out very well with the groups of small motor-driven machines, such as drills, lathes, shapers and mills using No. 8 wire as the group motor feeder and No. 12 wire as the tap. The machinist and operators of the various machines like this system very well, as it usually provides the disconnect right on the machine and in plain sight. This eliminates the hazard of opening what they think is the switch to their machine while changing heads, tools, dies, or gears and also the possibility of someone closing it accidentally. This disconnect also meets the requirement for machines having more than one motor.

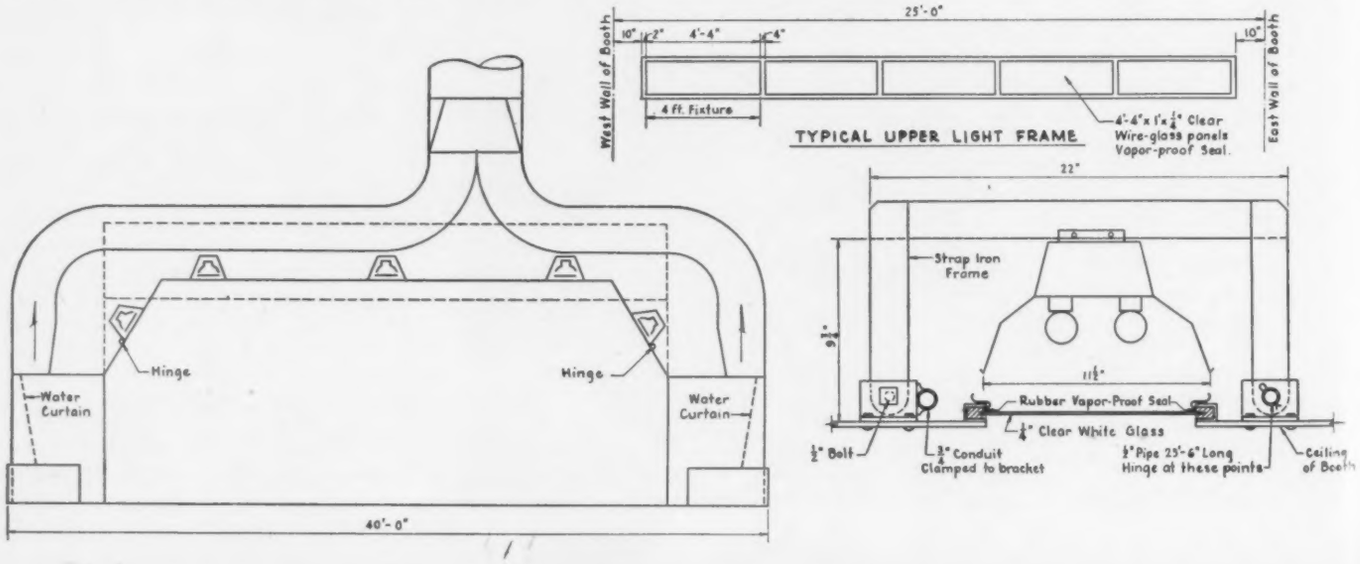
Wireways

The use of wireways is rapidly becoming the favorite, as it provides a very flexible and accessible means to install quickly additional circuits and to move machines from one location to another. With its allowance of 20% of area or thirty conductors it has a great many possibilities. The ground continuity, however, is rather doubtful, but this is easily remedied by installing a bare grounding conductor looped to ground bushings on each conduit or bolted to each section of wireway or busway.

This system fits in very well with present-day machine deliveries and production rush.

Delivery of machinery and equipment is sometimes as much as 90 days

Spray rooms are lighted more safely by placing lighting units under air pressure gasketed in an air chamber above the room, the light coming through wired glass ceiling panels



behind and when it does arrive an operator usually is waiting to go to work producing on it. If the shop has been adequately covered with a wireway system it is only a matter of an hour or so until the electrician has a fused switch or circuit breaker mounted on the machine and a run of conduit and conductors to a motor feeder circuit in one of the wireways. On a 460-volt, 3-phase power circuit a wireway with ten motor feeders of No. 8 wire would be capable of serving approximately 40 5-hp. motors or 70 3-hp. motors as each feeder would be capable of feeding twenty horsepower on a sixty ampere switch fused at forty-five amperes. Wireways also work out nicely to facilitate the distribution of lighting branch circuits and eliminates the large groups of conduits necessary to route them to their various centers, especially when 4000-watt circuits are used in high bay lighting.

The single-phase lighting and power load is really the heaviest and most severe load to contend with, especially in the aircraft industry. The nature and exactness of the work requires a high intensity and high foot-candle lighting installation. This means watts and kva. The use of fluorescent lighting has helped out a lot in lessening the power demand. There still remain the thousands of small portable tools such as drills, riveting hammers, buffers and grinders, heating units and chilling units to consume power also.

To supply these devices the most practical system is the 3-phase, 4-wire 120/208-volt circuit supplied by air-cooled transformers located in the middle of the various load centers. Delta-star connected, these transformers are fed from the 460-volt power boards and are located usually as near as possible to the distribution panels. The best example of the advantage of this system is illustrated by considering the factors or constants used to determine the ampere load when the value in kw. is known: 2.77 for 3-phase, 208-volt as against 4.17 for the single-phase, 240-volt. As a concrete example, take a load of 25 kw. Multiplying it by each of these two constants it is found that the load on 3-phase is 69.2 amp., whereas it is 104.2 amp. on single-phase, or to determine the wire sizes, it takes four No. 4 wires in 1½-in. conduit for the 3-phase, instead of three No. 0 wires in 2-in. conduit on single-phase. Likewise the entire electrical system can be balanced more easily and a lighting installation can be made quickly at any point in the plant, an important consideration when changing of production requires it.

Use of sprays and laquers for quick finishing of materials turned out in defense production has introduced the problem of safeguarding the spray room or booth, often a very large space and requiring high intensity of lighting for seeing to do the job well, from possible hazards due to either the heat of the lamps or the arc made in switching on or off of lighting circuits. The spraying room problem seems to be very well solved by a combination use of the water-curtain spray booth to draw off the vapors and to salvage the pigment at the same time, and by installing lighting in ducts or spaces behind wired glass panels, sealed and gasketed and having in the duct an air pressure greater than that in the spray room itself.

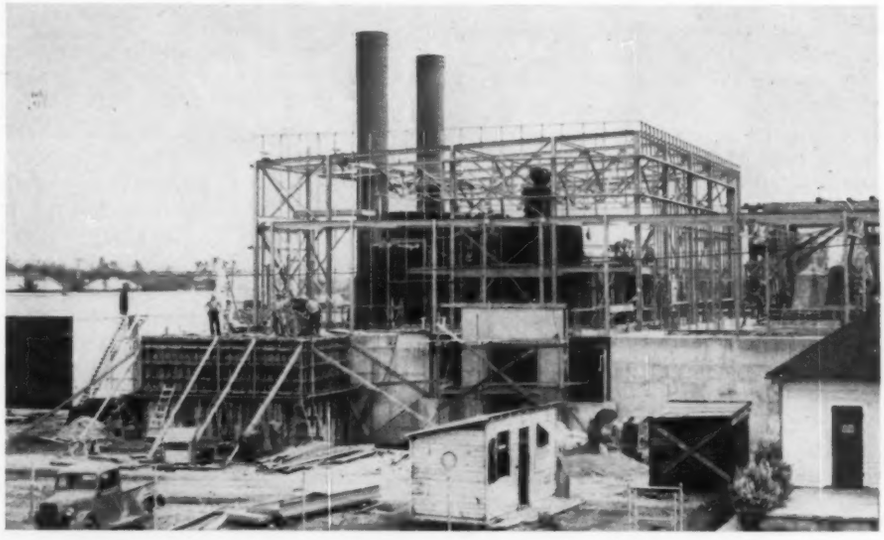
While some of the recommendations for the wiring of defense plants, contained in this article, may seem elementary and fundamental, the re-emphasis of them will not be amiss. In the haste to get new plants into production or to convert old ones over to new high-speed production there may be a tendency to want to ignore such fundamentals of safety—which, after all, are fundamental too to continuity of production, to efficiency of equipment and of labor and to elimination of spoilage of much-needed materials. To meet the highly mechanized and efficient threat from overseas it is in the interest of national security that the electrical system itself be secure. In his experience the electrical inspector has found that the safe installation is the well designed one.

GO 64-A

Revision of General Order 64-A of the California Railroad Commission—the rules governing overhead line construction—is nearing completion. After three years of work by committees representing power suppliers, communication companies, railways and miscellaneous interests, a draft of the revised rules was submitted for hearings before Commissioner Ray Riley on June 24. The original order was first drafted in 1922.

After consideration of changes and criticisms submitted by the various interests affected by the rules, the commission will issue the final order. It will incorporate numerous changes aimed at placing the line construction requirements in line with modern practice and in keeping with recent interpretations of the earlier specifications. Many changes have been made in the interest of greater safety.

A summary of the various changes will be printed in ELECTRICAL WEST when the final order is issued.



Two 10,000-kw. steam turbo-generators are being installed in this modern steam plant for the Burbank (Calif.) Public Service Department to meet unprecedented load growth brought on by defense industries. In the 1930-40 census decade Burbank was one of the fastest growing communities in the country, due to residential and commercial development. Consumption rose from 8,901,000 kwh. in 1930 to 42,708,000 kwh. in 1939; peak demand jumped from 2,350 kw. to 9,975 kw. Due to expansion in the airplane industry, however, this year consumption will exceed 94,000,000 kwh. and peak demand surpass 24,000 kw. Just one plant—Lockheed Aviation—jumped from a demand of 700 kw. and a monthly consumption of 200,000 kwh. in 1940 to 5,200 kw. of demand and 2,500,000 kwh. per month this year. The steam plant will supplement power deliveries from Boulder Dam.

Fundamentals of Coordinating Fuses and Relays

Solution of an assumed protection problem, showing what must be considered in choosing equipment for: instantaneous tripping and reclosing and subsequent time delay

By R. M. Wilson and C. E. Cannon

Washington Water Power Co.

TO coordinate, according to Webster, means to place in harmonious relation. When the term is applied to a fusing and relay scheme, it implies that the fuse sizes and relay settings have been chosen to provide selective action under fault conditions, thereby promptly isolating the faulty section while maintaining service to the remainder. The extent of the service outage will depend upon the location of the fault and upon the design of the coordinated fusing and relay scheme.

In order to improve the continuity of service a great many ingenious schemes of relaying and fusing have been developed. Manufacturers of fuses have cooperated in furnishing valuable data in the form of fuse characteristic curves and coordination charts. While the fundamentals of fuse and relay coordination are well understood by most engineering and operating personnel they will be briefly reviewed below.

Whenever two or more overcurrent protective devices are placed in series in a circuit, as in Fig. 1, it becomes necessary to coordinate them in order to secure selective operation. It is common practice to refer to A as the *protecting* device (fuse or oil circuit breaker) while B is the *protected* device when referring to A. On the other hand B is the protecting device with reference to C, and C becomes the protected device. For proper operation the total clearing time of A for all currents up to the maximum available at A must be less than the minimum time required to operate or damage B. Similar relations must hold for B and C. An analysis of the problem usually necessitates the plotting of the time-current characteristic curves.

For A, when it is considered as a protecting device, the maximum total-clearing-time characteristics should be used in the case of a fuse, while in the case of an oil circuit breaker the relay time plus oil-circuit-breaker clearing time should be used. At B, when it is considered a protected device, the minimum damaging-time characteristics should be used in the case of a fuse, and the relay time should be used in the case of an oil circuit breaker. The minimum damaging time of a fuse is usually considered as 65% to 75% of the minimum melting time. Where possible it is desirable to allow a margin of time between the curves to take care of operating variables.

Whenever a engineer is looking for the solution to a problem he must have available certain facts or must make certain assumptions before he starts. The problem of fuse and relay coordination is no exception to the general rule and, therefore, before we can deal intelligently with any problem in fusing or relaying it is necessary that certain ground work must be done. Briefly, it is necessary that the maximum r.m.s. amperes available for faults located at various points along the system, also the peak load plus any motor-starting loads that the circuit may have to carry, be calculated.

NORTHWEST REPORT

A paper of the Apparatus and Design Sub-committee (C. E. Cannon, chairman) of the Electrical Equipment Committee (J. Hellenthal, chairman) of the Engineering and Operation Section, Northwest Electric Light & Power Assn.

Since it is practically impossible to deal abstractly with the coordination problem we will make some hypothetical assumptions and set up a distribution system. Fig. 1 shows a simple distribution system such as might be found on any one of many power systems all over the country, and in the next few paragraphs we will briefly outline several methods of protecting the customers, on this sample system, from interruptions.

The time-current characteristic curves on Fig 1 illustrate the most elementary method of coordination for our sample system, an oil circuit breaker, C, protecting a feeder with two branches, each

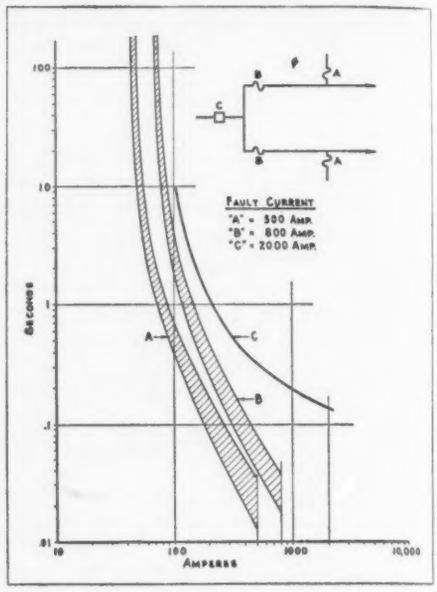


Fig. 1

branch of which is protected by a fuse, B. The laterals off the main branches are in turn protected by fuses, A. Since we have assumed that at point A a maximum fault will cause a flow of 500 amp. of short-circuit current, it is necessary that the fuse at B be large enough to coordinate with the fuse at A when 500 amp. is flowing through both fuses. For the particular make of fuse which we have assumed for this study, the above limitation dictates that fuse B shall be at least of 45-N-amp. size. Fuse A cannot be larger than 30 N amp. if it is to coordinate with B and isolate any faults without damaging fuse B. Curve C is the time-current curve of a very inverse relay on oil circuit breaker C.

With this sort of protection, any fault in the section of line protected by fuse A will blow the fuse and cause an interruption, the duration of which will depend upon the length of time necessary for linemen to repair the damage and refuse the cutout. Even though the fault is of a temporary nature the interruption will depend upon the speed with which linemen are dispatched to replace the blown fuse.

A fault between A and B will blow fuse B and again the interruption will depend upon the accessibility of the damage and the rapidity with which the fuse can be replaced in case of a temporary fault. In case of a temporary fault between B and C, the oil circuit breaker at C would remain open until manually closed by the substation attendant. In case this sample feeder was fed out of an unattended substation it is probable that the whole feeder would remain out of service for some time.

When attention is given to operating records from utilities all over the country, which indicate that a large majority

of all faults on feeders are of a temporary nature, it can be readily seen that the above protection is far from ideal.

The first improvement, and one which can be made at little expense, as shown on Fig. 2, is to install a reclosing fuse at A. It so happens that under the conditions which we have assumed, i.e. 500 r.m.s. amp. fault current at A, it is not necessary to change fuse sizes at B since a 45-N-amp. fuse at B will clear two 20-N-amp. fuses at A operating in sequence without damaging the 45-N-link.

With this type of protection the service to the customers from A to the end of the line has been improved rather inexpensively since any transient fault will blow one 20-N-amp. link, but by the time the second 20-N-amp. link closes-in, the fault will be cleared and service will be restored. Permanent faults, however, will blow both 20-N-amp. fuses and clear the trouble. Bear in mind that the status of the protection for faults between A and C has not been changed and also when one of the two fuses at A has blown the whole system reverts back to the type of protection shown in Fig. 1, until the blown fuse has been replaced.

The second step in improving the service to our mythical system, Fig. 3, is the installation of a reclosing head on the oil circuit breaker at C, with double relaying to provide instantaneous initial oil-circuit-breaker tripping and reclosure, with time delay on subsequent operations. The advantages here are to be found in the fact that temporary faults will not cause a permanent outage to any part of the feeder.

Here a question is raised that must be weighed carefully before making the installation, the question being: "Is it better to interrupt the whole feeder for a short time (approximately 1 sec.) or let a part of the feeder take a longer interruption (½ hr. or longer)?"

The answer to this question depends on the type of customers on the feeder and many other factors.

It will be noticed in comparing Figs. 1, 2 and 3, that in order to coordinate fuses with the total clearing time of the oil circuit breaker as actuated by the instantaneous pickup on the relay in Fig. 3, it was necessary to increase the size of both fuses A and B appreciably. On some feeders this might be very objectionable since the fuse at A must be small enough to clear a minimum fault at the end of the lateral. Also, if an arc is maintained on a conductor for over 10 cycles, there is the possibility that the conductor will burn down.

The last change to be made in order to improve service embodies the use of a new piece of equipment called the shorting contactor, shown as D in Fig. 4. The full description of this device is contained in AIEE Technical paper No. 41-45 which was presented by G. A. Matthews of the Detroit Edison Co. at the AIEE winter convention in Philadelphia this January. Essentially, the shorting contactor is a mechanical device that will recognize fault currents and put a short circuit on the line between the fault and the source of power, thereby collapsing the voltage at the fault and extinguishing the arc which, if it is of a transient nature, will not re-establish itself. As far as giving continuity of service, this method has only one advantage over the previous method (Instantaneous plus time-delay trip—Fig. 3). According to exhaustive tests made by the Detroit Edison, if the voltage at the fault is collapsed rapidly enough (1 cycle or less) the conductor itself will not burn off, hence the shorting contactor, which operates in about ½ cycle not only saves unnecessary blowing of fuses but also protects the conductor from unnecessary damage.

An examination of Fig. 4 shows that by using the high speed of the shorting contactor we were able to go back to the original fuses as installed in Fig. 1. When using the shorting contactor it is not necessary to have double relaying on the oil circuit breaker, since the shorting contactor will automatically draw enough short circuit through the time delay relay that the oil circuit breaker will open in one or two tenths of a second.

On all the figures the curves are numbered to correspond to the location of the device on the feeder sketch. On Fig. 3 curve C-1 is the total clearing time of the oil circuit breaker with instantaneous pickup on the relay (8-cycle breaker plus 2-cycle relay), C-2 is the time-delay-relay operating time, and A and B are the fuse curves. On Fig. 4, curve D is the total operating time of the shorting contactor, C is the operating time of the time-delay relay on the oil circuit breaker and A and B are the fuse curves.

On all fuse curves the width of band is required in order that the protecting fuse will not cause any damage to the protected fuse. The top side of the band is the total clearing time of the fuse, while the bottom side of the band is 75% of the total melting time and is called the damaging point. As an added safety factor we have arbitrarily said that ½ cycle must be maintained between fuse curves.

Fig. 2

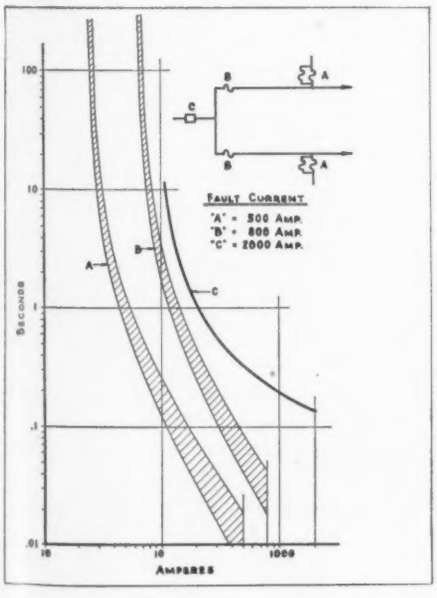


Fig. 3

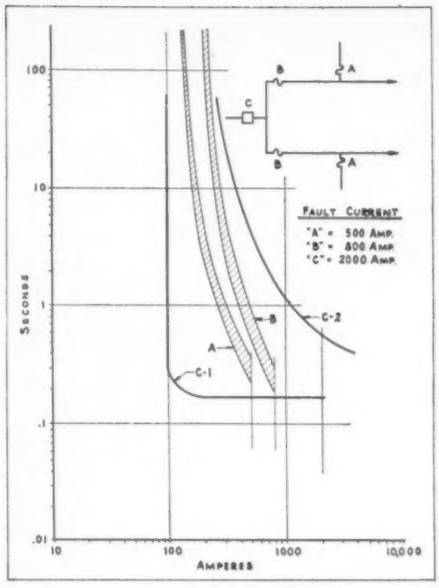
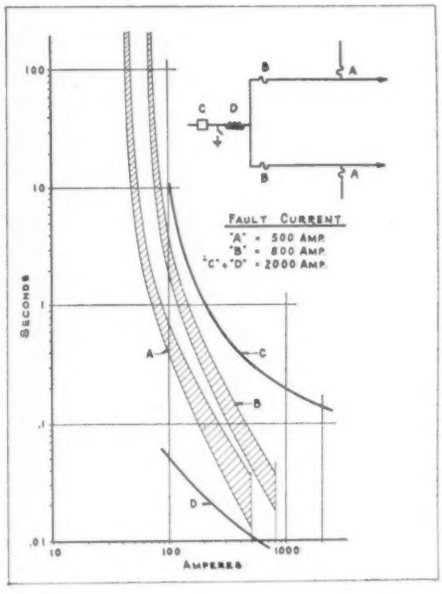


Fig. 4



All-Out Agriculture

Butter AND guns vital to defense-farmer's power needs important

By H. B. WALKER*
Chairman, California CREA

TO DATE, our government has done little, other than through price-fixing programs, to help agriculture meet its problems during a war period. On the other hand, many influences are at work, which, in the end, are likely to cause hardships for our farmers, as well as possible embarrassment to our nation if someone does not look out for particular phases of the service requirements of this industry.

Agriculture has, over a period of years, produced a surplus of food products. These have been stored by the government and now they are being pledged to countries less fortunate both as part of "the arsenal of democracy" as well as a tempting morsel to empty stomachs in creating interest in peace proposals. Yet the productive side of agriculture is receiving practically no attention so far as defense measures are concerned. Steel and other structural materials are subject to federal priorities to build tanks, guns, airplanes, ships and ammunition, with these materials for farm implements for use in farm production placed eleventh on the priorities list. Electrical power, concerning which a shortage is hinted for some Eastern areas, may be requisitioned for defense industries to an extent which might embarrass our farmers dependent upon motors for pumping, and for other uses on the farm. Engineers, chemists, doctors and bacteriologists in the making at our universities, may obtain draft deferment because of ultimate national need, but not for agriculture. Mechanics and service men in rural areas where they were making a living repairing, servicing and even building farm equipment, are now being lured into shipyards and steel mills where they may strike for higher wages if they don't want to work. Likewise, the laborers in agriculture are taking the cue, refusing to care for perishable crops.

It may seem, upon first thought, that farming is doing pretty well. Prices are better, but after all very little thought is devoted to the service and productive needs of our farmers in the present emergency. Perhaps our programs should be directed toward calling attention to some of these needs in advance. Just because farm boys and farm workers are taken into the army doesn't lessen the demand for milking machines, or the special materials from which they are made. The need of electricity in defense doesn't eliminate the need of it to pump water, run motors for milkers, or supply energy for refrigeration. Food production, if it is to be a factor in "the arsenal of democracy" or an appeal for peace has to result in tangible packages for human consumption rather than to rot on the ground.

Personally, I am "all out" for agriculture in this emergency. I believe we have a chance to serve in our defense program by thinking and doing something about these problems which apparently are of secondary interest to our national defense planners.

Great Britain has asked for cheese, eggs, canned tomatoes and onions. The production and processing of these come within the field we are pledged to serve. Without forgetting the importance of direct defense programs, I sincerely hope some of us will remember the less spectacular and do our utmost to avoid neglect of the interests of agriculture. Let us keep these things in mind as we go over our programs in rural electrification.

* Extracts from remarks at a meeting of the California CREA, Fresno, June 6, 1941.

Floodlights Foil Invasion

MIGRATING wild ducks, which have consistently sabotaged seed plant fields around La Conner, Wash. —at times extending their destruction over 40 acres in one night's assault— are reported to be permanently discouraged by a new defense on one La Conner farm, a powerful revolving floodlight battery rotated by an old washing machine mechanism (see cut). Prior to installation of this novel "protective lighting" equipment, eight men were detailed to blaze away with shotguns, only succeeding in moving the invaders from one section to another. Observing that a nearby airfield beacon kept adjacent farms singularly free of hungry fowl, the electric scarecrow idea was rigged up—and progressive rural Washington keeps the night watch no more, confident kilowatts will cow the culprits.

Infra-red Frost Value Disproved

Infra-red lights which have been suggested as a new and superior means of protecting citrus trees from frost, failed to give any positive results in a test recently completed by the University of California College of Agriculture.

H. S. Gordon and F. A. Brooks of the agricultural engineering division reported that they were unable to obtain any experimental evidence that exposure to the rays from low intensity infra-red lights either protected citrus trees from frost or gave them increased frost resistance.

In the test a valencia orange tree, a St. Michael orange tree, and a Eureka lemon tree, all from four to five feet high and bearing fruit, were exposed to infra-red radiation and frozen slowly in a refrigerating room. The experiment was undertaken at the request of the Committee on the Relation of Electricity to Agriculture.

According to Gordon and Brooks, infra-red lights were used in Florida citrus groves during the past winter and failed to give frost protection.

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PRINT IN BINDING

E-ECTRICAL WEST

Sales Guide

Kitchen Priority

First in war, first in peace, first in the hearts of all countrymen — that's the kitchen. Even George Washington would agree to that twist to the toast usually accorded him.

On the priority list of normal times the kitchen is first because that's where the food comes from. It is the center of home activities and home entertainment. On it family health and happiness largely depend. It has always been the real social center of the home.

Priorities affect a lot of things, but so far, the elements of an electric kitchen can still be sold, if not in the original form, in reasonable facsimiles. With tomorrow's possible merchandise shortages the wise dealer and salesman will put his time and energy into a few bigger unit sales rather than go after volume at low price. There's a new group of people eligible for the all-electric kitchen now too. Good wages and steady employment in defense industry makes the family of the defense worker a first line prospect for an all-electric kitchen if it never was in that class before.

ELECTRIC KITCHENS

JULY 1941

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Selling is fun

WHEN YOU KNOW YOUR STUFF!

Heart of the American Home

Every influence today is making the American home more precious, more appreciated. And before the emergency is over the sacrifices necessary to preserve and defend the homes of Americans will have turned everyone's attention more to the home itself, what it means, what can be done there for education, entertainment and living generally. The kitchen is the home laboratory, its food center, and it will return to being its social center as it was in the past. What does this mean but better equipped kitchens, more attractive kitchens, remodeled kitchens.

To sell an electric kitchen is a real achievement for any salesman, and its accomplishment brings such satisfaction to the customer that it makes the sale a joy to make. The extra time, care, preparation and finesse required all bring their reward when the job is finally done. A cheerful, handsome new kitchen, well equipped, brings pride and happiness to the customer and a thrill of big, important selling to the salesman. Each job sold is more or less a custom-built job, designed to fit the particular wants of the customer. It takes ingenuity, organization, real planning. There's some real zest to that kind of a job.

What's the best approach? One of the easiest approaches and most successful used by salesmen who have done excellent kitchen business has been to ask the range or refrigerator customer, "Why not make it an electric kitchen while we are at it? Then the whole kitchen will be as new and convenient as the new range."

In the development of a kitchen sale there are many factors that the prospects—either the husband or wife or both—will want to consider. It pays to anticipate these and to be able to sell on the basis of these factors. Here they are:

First comes family well-being. Stress the importance of the kitchen as the center of food preparation and health—the food center. In present times more care should be given to this factor. More eating may be done at home. More economies in food preparation require good equipment. (Tell the range and refrigerator food story too.)

Cheerfulness and attractiveness comes next. Since about 66% of a woman's waking time is spent in the kitchen it surely ought to be the most cheerful room in the house.

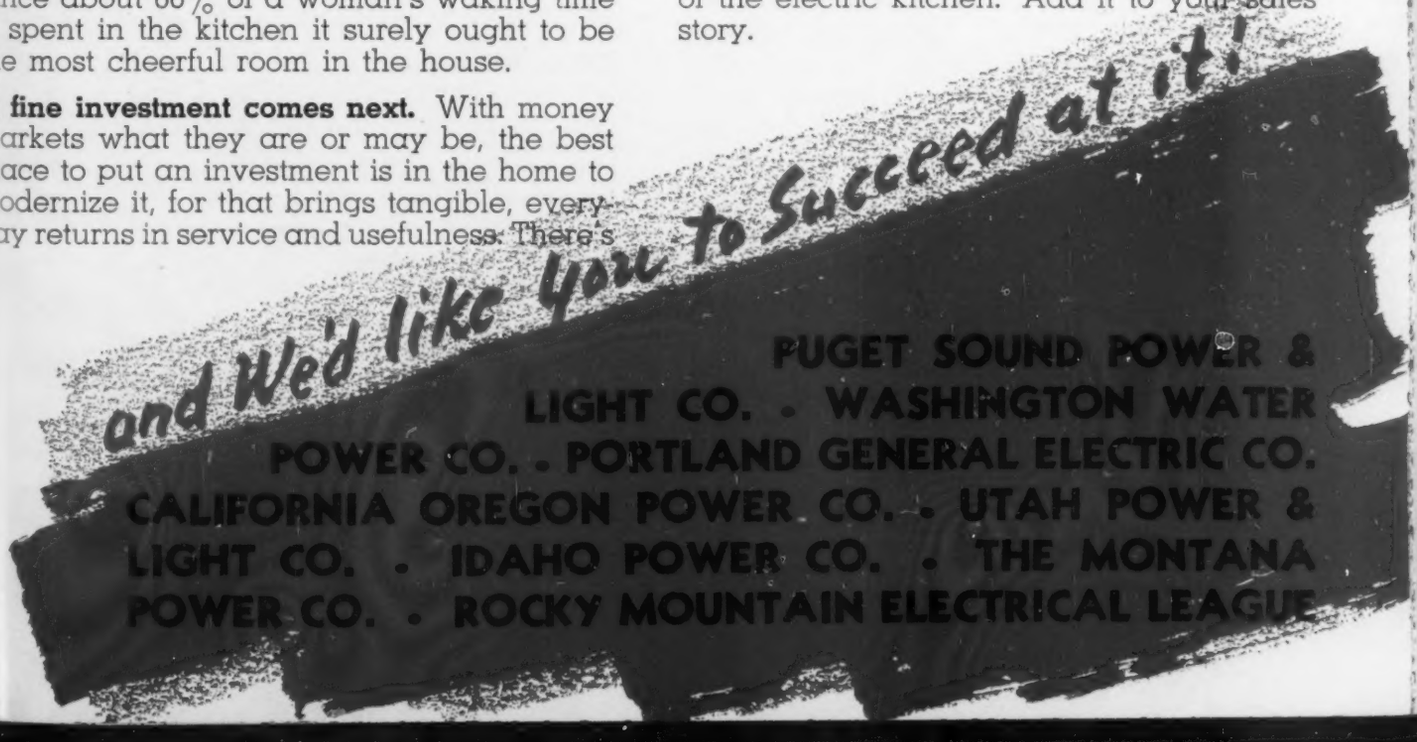
A fine investment comes next. With money markets what they are or may be, the best place to put an investment is in the home to modernize it, for that brings tangible, everyday returns in service and usefulness. There's an extra dividend in making the home more valuable, more saleable or rentable if necessary, a better long-time investment by reducing obsolescence.

Socially the modernized electric kitchen offers many advantages. When made large enough and embodying a dining center and possibly a place to visit with friends and neighbors, at least for family gatherings just as in pioneer days, the attractive electric kitchen returns as the social center of the home. An attractive kitchen will tend to promote pride in it among the youngsters so that they will want to invite their friends to meet there instead of chasing out.

Convenience and labor saving are two of the major benefits from an electric kitchen. With so many activities, these days, the family can well use the conveniences and labor saving help of electricity. It is better than a servant and is within the means of almost anyone.

In cost the electric kitchen can be had for about the price of a new car and if necessary on terms similar to those on which a car is bought. It can be bought at one time as a complete installation or it can be purchased by centers—a food storage center, including the refrigerator; a food preparation center, including the electic sink and garbage disposal unit; or the food serving center, including the range. The electric kitchen does not depreciate as does a new car. In fact it increased the value of the home. When you drive a new car out of the salesroom it has depreciated 25%; it is a "used car."

Every single benefit offered by each electric appliance in the kitchen is a potntial benefit of the electric kitchen. Add it to your sales story.


and We'd like you to Succeed at it!
PUGET SOUND POWER & LIGHT CO. . WASHINGTON WATER POWER CO. . PORTLAND GENERAL ELECTRIC CO. CALIFORNIA OREGON POWER CO. . UTAH POWER & LIGHT CO. . IDAHO POWER CO. . THE MONTANA POWER CO. . ROCKY MOUNTAIN ELECTRICAL LEAGUE

"Stuff" to Know

The switch is in your favor

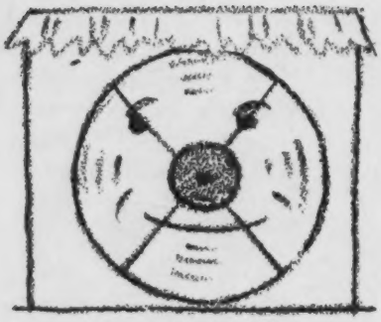
Working for you as an electrical dealer is a strong trend, a switch to switches, to electric kitchens. Recent figures from the Modern Kitchen Bureau show even greater percentages of electric appliances to other types and a strong swing to the all-electric kitchen. It is an idea that appeals and is in as much demand as the fancy bathroom first was.

Another "Gallup poll" of the situation was made when McCall's Magazine for women had its "Dream Kitchen" contest. Some of the figures can be of use to you in helping you to size up your prospects. Of the 4,157 entries, 11% were from Pacific, 7.3% from Mountain states; 85.3% were homemakers. All but 1.5% wanted large kitchens and 94.4% wanted a dining center in the kitchen. Here's an interesting trend—61.9% wanted a laundry center as part of the kitchen too. Another important point, in view of the priority problem, was that while 22.7% wanted metal cabinets, 72.2% wanted wood, and 56.9% carpenter-built. Metal cabinets are something you as a dealer can sell, but even if they are restricted you still can sell wood.

Preference for electric appliances among these contestants was strong. For electric refrigerators it was 89.1%. Appliances specified by over 85% of the contestants included toaster, electric clock, food mixer and waffle iron.

And the switch is to electric

The preference for the electric range over stoves of all other fuels was 67.5%. This checks with the MKB figures for sales for the first quarter of 1941, one electric to 2.6 of all other types. The switch is on and you can turn up your own sales with electric ranges.



Breeze into Ventilation

Every kitchen, regardless of what other appliances it has, is a prospect for kitchen ventilation of some kind. The kinds range all the way from a simple window ventilator fan to a complete ventilating hood over the range similar to that employed in restaurants. Of course the latter, containing a grease trap, is a superior article and really makes a fine sale and gives the customer maximum satisfaction. Where a fuel range is in use as much as a half pound of grease is removed from the trap per month when cooking for a family of five.

Remember the selling advantages of kitchen ventilation? Boiled down to everyday practical terms they include these:

A house free of cooking odors and a clean smelling kitchen, free from steam, food odors, smoke and grease. Cabbage is a bad actor and stays around long after cooking, in drapes and rugs. A kitchen ventilating fan will remove such odors as they are created and keep the house fresh.

Cleaner curtains and walls and less redecoration necessary when there is a kitchen ventilator.

Fresh air sweeps in as the fan drives stale air out. Maintains vitality because of the change of air in the kitchen and coolness in the summer. Where there is an evaporative cooler installed at another window, the kitchen fan draws cool air to the kitchen from it.

"Stuff" to do

Appliance Credit—What About It?

By H. Garfinkel*

General Electric Contracts Corp.
San Francisco

CREDIT sales—term sales—what should a dealer do about them during these times, and why? Should he worry about appliance terms when business is booming and stock hard to get?

These questions ring in a dealer's ears today. They come whispering from his own sense of concern over the future or are buzzed in his ear as a warning from reliable credit men. What will he have to do about them?

Suppose first that the situation is looked at in detail before drawing conclusions or trying to chart a course of credit conduct. The picture shapes up somewhat like this:

Industrial production is at an all-time high, and national income is steadily rising. With this increase in purchasing power it is logical that retail sales will show phenomenal gains.

The force of the present defense boom is by no means distributed equally nor can it be said that it is considered an unmixed blessing in the communities most affected by it. In these areas an undertone of concern, if not genuine fear as to what will occur when the inevitable period of readjustment sets in, is frequently evident. No one can forecast with certainty at this time just how severe the post-boom reaction will be in these areas.

Not to appear as an alarmist, that is what the facts are. There is a certain feeling of instability about this forward rush of business, which is quite different from the general psychology during the 1929 boom. There is little disposition to talk about the need for more housing and more schools. The feeling seems to be—why build for people who are not going to be here long? Many of the new workers in the defense plants, either by choice or necessity, live in trailers bearing license plates from almost every state in the Union.

Even the federal government seems to be feeling its way, as indicated by plans to build demountable homes which can be torn down after the defense program is over. One merchant extending credit to employees of a navy yard said that the sudden rush of business has brought with it a feeling of futility—"we are damned if we don't, and double-damned if we do."

What does all this mean from the standpoint of the appliance dealer? He faces today one of the most difficult periods of the last twenty years. Not only will his good judgment be tested to the fullest during the duration of the defense economy, but he will have to fight against pressure from within his own organization to increase credit sales contrary to his better judgment. In addition, the whole nature of the credit field may be radically changed by government edict.

The dealer has the unenviable job of so controlling the throttle of credit volume during this period that losses are held to a minimum. It is futile for him to look to the days of the last war for guidance. The credit situation confronting us today is quite different from what it was in the last World War.

A dealer will do well not to rely too heavily on the fact that installment selling came through the 1930 slump with banners flying. Installment selling may be destined for a fall—unless steps are taken now to restrict and readjust the installment terms structure.

During recent years we have witnessed a steady weakening of the usual credit safeguards. Credit volume is much greater, time payment terms are excessively long, and in many department stores accounts receivable investments exceed inventory investments, and above all, credit is being granted to customers in very much lower income levels than at the end of the last World War, or even eight years ago.

As a matter of fact, we move into this up-surge with the public strongly educated to the idea that buying for cash is slightly unconventional. Without any desire to appear an alarmist, it still seems reasonable to say that unless terms are in good shape, if and when the current defense spending tapers off, a dealer risks encountering terrific losses through over-extended credit. The time is here for the wise retailer, recognizing the handwriting on the wall, to undertake an immediate tightening up of his entire installment terms structure. Within another six months retailers might find it advisable to raise down payment requirements still more, and to reduce the maximum ceiling for terms.

To bring the currently threatening terms situation under control will call for the most exacting type of business leadership on the part of the retail credit profession, and many a credit manager will have to face the unpleasant task of performing his duty despite acute merchandising pressure.

It is common belief that the only time long terms are economically justified is during a period of declining sales, or generally depressed business conditions when such terms might have a stimulating influence. If terms can be restricted now they will provide the necessary reserve in the future when liberality is once more demanded in order to equalize sales during a period of declining business activity.

Back in 1937 when business was soaring into the stratosphere, as now, customer equities were getting too thin and our company took steps in cooperation with our dealers to correct the situation. Due to this action, our experience in the subsequent 1938 depression was good. It would have been better for dealers had the changes been made in early 1937 rather than in the fall of that year.

With times so good and national income up, one should expect not weaker but stronger down payments and

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*Presented at the Appliance Forum, Pacific Coast Electrical Assn. convention, Hotel del Coronado, May 22, 1941.

shorter terms. The retail buyer's psychology, however, doesn't operate that way, and it won't if merchandising and financing do nothing constructive about it. It must be encouraged.

In lean times, dealers and finance companies have eased credit requirements in order to induce people to buy. Experience with such obligations has fully justified that policy, for those who committed themselves in those times were not speculating with their future ability to pay. But liberal credits in the depths of a depression are an entirely different thing from liberal credits on the crest of a wave. Certainly present near-boom conditions do not justify or should not require such stimulants. When new credit lows, therefore, are being touched in times like these, they certainly are a signal that is not to be disregarded.

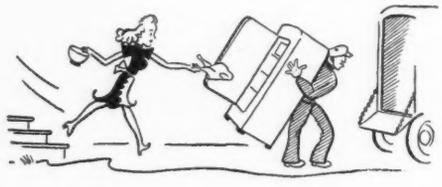
Another unusual factor for these wonderful times is that collections today are difficult, whether because credits are thinner, the public attitude to debt has been made nonchalant or for other reasons. When collections are difficult under favorable conditions, that, too, is a signal, for what can one then expect under less favorable circumstances. Incidentally, how can anyone in credit expect a better customer attitude toward collections if the credit man is a party first to weak credits and then to lenient and even lax collections.

Weak down payments and terms or any other fundamental disregard of credit granting in good times are signs of credit excess. Usually induced by reaching for sales, they indicate an unwise use of credit and, in turn, represent unhealthy merchandising. Nevertheless, many even now are encouraging others to go out on a credit limb even though we can be sure those limbs will break off some day when the business sap (and I'm not speaking of any individual in this case) is running down instead of up.

All business should respond to the danger signals and not give just lip and pen service but actually work for the credit and merchandising good, so that the public, business and the country will always be in sound economic condition, come what may.

The only intelligent position dealers can take today is one of conservatism in both credits and merchandising. This is based on the idea of the wise thing to do rather than from any scare or fear. Those in the credit end of the business do not get a direct chance at the retail buyer at time of purchase because the credit transaction is closed by the dealer. Their only hope of keeping to a sound retail basis is to counsel with dealers not to spread themselves out in a business way without the greatest care and forethought. Rather it is wise to merchandise carefully, keep credits and collections close, and to put extra profits or funds in good, and preferably, liquid reserves. Pulling in the credit rope at the right time is far better than throwing out the life line at any time.

While the retail customer has a job and is getting good money, let him pay his back bills and then purchase only on a basis and over a period of time on which there can be no doubt. It is more than ever wise credit today to inquire into a customer's background and try to sell him to take credit on the basis of his stabilized pay rather than on a grossly exaggerated wage position.



One of the finest things a business man can do at any time is to counsel with his customers to stay within credit bounds. That is all the more advisable and praiseworthy today. Real education of the public along these lines is a most constructive goal for which we all should shoot.

Then, there is the question of regulation. If dealers and finance companies do not keep credits within bounds themselves, they are likely to see more and more proposals to set up regulatory provisions, and possibly by groups who are not well informed on the subject or who have punitive purposes. The natural objectives of regulating installment credit will be to protect the family not only from injustice but also from its own easy improvidence.

For instance, credit can well do without the grosser forms of advertising which lure or high-pressure the public into excessive debt. In fact, constructive advertising could go far in the opposite direction to its own distinct credit. Poor credit conditions can only be aggravated when dealer after dealer will sell to the same person, notwithstanding his apparent inability and well known previous failures to pay. Business certainly can't be that bad.

The time has come to discard "no down payment" policies and advertising of ridiculously long terms, which more than anything else has directed the attention of government officials to an apparent overdose of installment selling. Failure on the part of retailers to accept this as axiomatic or any attempt of some retailers to take advantage of others by continuing to advertise without regard to the signs of the times will merely hasten the day when those who advocate government regulation will become the majority.

It has been definitely established from the experience of a number of financing organizations that more conservative terms (larger down payments and installments) mean greatly reduced repossession figures. A special study has been made of refrigerator contracts. The repossession experience shows:

For *each* repossession on contracts written for 12 months or less terms there will be:

2 repossessions on those written on 13-24-month terms.

4 repossessions on those written on 25-30-month terms.

8 repossessions on those written on over-30-month terms.

Repossessions on over 30-month terms are eight times as high as on one-year paper, and four times as high on two-year paper. With such a record, is it worth a dealer's best efforts to sell on shorter terms? The answer is obviously *yes*.

The study shows that one out of every five over-30-months refrigerator contracts will result in repossession; one out of ten on 25-30-month terms; one out of twenty on 13-24-month terms; one out of forty on 12-month or less terms.

Of course, there will be the exceptional dealer who will say that his experience does not show up so poorly on long-term paper. He may be right, but as Jesse Jones, Secretary of Commerce, said, "If the law of averages has not already caught up with you—move right now, before it is too late."

Now is the logical time to get terms improved, to avoid future losses. More conservative terms now are for the good of everyone engaged in the appliance business.

A Dealer's Future?

Fall Market will tell trends in stock and selling

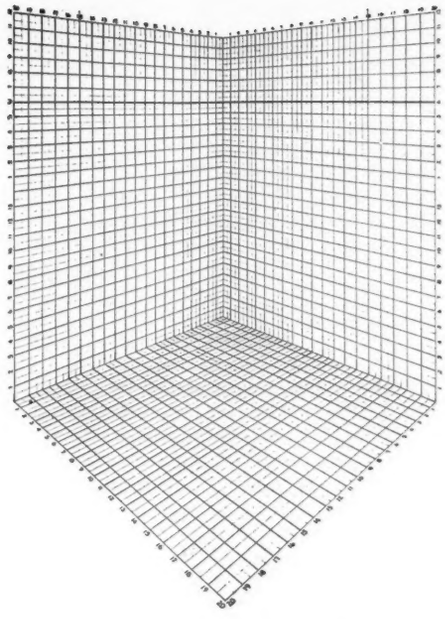
Many a dealer has asked himself or his distributor, "What's to become of radio?" With the Federal Communications Commission putting the squeeze on networks on one side, and priorities putting the squash on radio sets on the other, dealers are wise to question the future. For that reason the headlined speaker at the 14th annual Radio and Appliance Trade Dinner, at the Western Merchandise Mart, during market week, has been selected from the radio industry to answer just such questions.

Fred D. Wilson, manager of field sales activities, RCA Manufacturing Co., Camden, N. J., will be that speaker, according to announcement of George L'Amoreaux, promotional director of the Mart, who is in charge of the appliance dinner. The dinner will be held on Wednesday evening, Aug. 6, in the Mart Club as usual. The other speaker will be someone from the gas appliance industry, not yet announced.

In tune with the radio address, the complete entertainment program will be put on by National Broadcasting Co., under the direction of Al. Nelson, district manager.

Because of the uncertainty of the merchandising scene under war conditions this market is apt to be indicative of trends and pressures and will be one watched with more than the usual interest. What the manufacturers do about models, styles, new features, substitutes; what they can do about deliveries, materials, prices—all these will be discussed with a realism that will make attendance by dealers more necessary than for many markets in the past. Consumer demand for merchandise is such that the dealer is in a tight spot. Credit tightening and profit margin on restricted volume are other factors dealers will be discussing with their suppliers at this fall market.

● "Small Electric Appliances," a sales training bulletin recently published by Good Housekeeping, presents pictorially various modern appliances such as irons, coffee makers, mixers, table stoves, and suggests sales points of each. Common questions asked by buyers are given and factual answers are supplied by the bulletin. This bulletin is designed to assist the retail salesperson to do a better merchandising job at the point of sale—and copies are available at ten cents from the publication office.



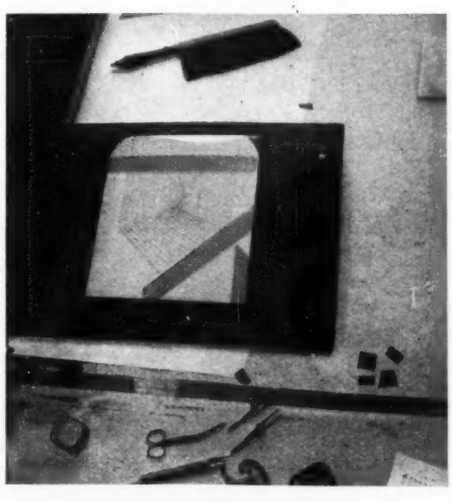
Perspective for kitchen plans is already drawn in with dimensions correctly proportioned to scale

Drawing Timesaver

Kitchen plans in perspective are usually considered by the prospect to give a clearer mental picture of how a finished kitchen will appear than an ordinary plan and elevation. However, perspective requires careful working out of vanishing points and when drawn to scale, a number of intricate variables in measurement, enough to discourage most draftsmen. Where many such plans are to be drawn, the kitchen planning designer takes short-cuts.

Ray Severine of Idaho Power Co., at the time he was doing kitchen design layouts, developed a template in perspective so that he would only have to make his measurements once and from then on could draw with speed and accuracy. Further to facilitate its use, he made up a special drawing board of heavy fibreboard upon which the template was mounted permanently and extending clear plastic rulers were pivoted at the vanishing point. By inserting a lettersize piece of tracing paper into the corner pockets holding the template, the drawing can be made over the template drawing. Measurements are easily made for standard dimensions of cabinet sizes and appliance shapes and sizes and a finished drawing turned out with correct perspective. Similar ideas for quick measuring of elevation drawings were covered in an article in Electrical West, Nov. 1939, p. 30.

Template mounted on drawing board equipped with transparent plastic rulers



"Dream Kitchen"

"What American Women Want in Their Kitchens" is the title of a booklet produced by McCall's Magazine, based on the results of a recent "dream kitchen" contest sponsored by the publication. 4157 questionnaires are completed by contestants, 18.4% in the Pacific and Mountain states, and it is of interest to know that both student and professional top awards were to Californians.

Some of the interesting conclusions quoted in the booklet include the following: Decorating plan is keyed to latest appliances. Large kitchens with at least 16 ft. on the longest dimension are most in demand with a U-shaped over-all arrangement of appliances and white cabinets with blue linoleum counter tops. In addition to major appliances there is an electric toaster, waffle iron, coffee maker and clock and there is a 50-50 chance there is also an electric dishwasher and waste disposer. Aluminum and glass are the principal materials used for cooking equipment. Laundry centers are still scarce, but where there is one it is built around an automatic washer. At least five convenience outlets and a central lighting fixture as well as special fixtures over the sink and preparation counter are standard.

Electric refrigerators were specified by 89.1% of contestants. Electric ranges were planned by 67.5%; 32.4% electric dishwashers. Appliances specified by over 85% of contestants include: toaster, clock, food mixer and waffle iron. Radio, coffee maker, telephone, waste disposal and electric ventilator received 45% of the votes. Another 15% included dishwasher, roaster, water heater and sewing machine.

● Betts Electric at Penticton, B. C., recently advertised a list of gifts for "Expectant" Fathers in connection with Father's Day promotion in that community.

Water Heaters Hot

Seattle campaign tops all previous sales records

June wound up with a blaze of sales the four-month electric water heater campaign in Seattle of the dealers backed by Puget Sound Power & Light Co. Final figures were not available but from the selling pace established in the early months of the campaign since March, indications pointed to doubling or better of last year's water heater sales for the same period. Seattle City Light Department also conducted a water heater campaign during the same time, adding impetus to the all-out drive in Seattle.

Both utilities offered the new all-electric rate of $5 for the first 370 kw.-hr. or less per month and 7 mils per kilowatt-hour for all over 370 with a minimum charge of $5 per month. Therefore all customers using electric ranges without water heating were immediate prospects to secure the new-all-electric rate "available to customers in single family residences using electric service exclusively for their entire lighting, cooking and water heating requirements where such service could be supplied through a single meter."

Storage water heaters of 40-gal. minimum capacity with twin type thermostatic controls and noninductive elements were covered in the campaign.

Special advertising typing in with the Modern Kitchen Bureau's Donald Duck series included newspaper and billboard advertising, cutouts for counter and floor display and direct mail pieces. Puget Sound Power & Light offered a prize of $15 for the dealer in each district or division who during the months of March, April and May had the best electric water heater window or floor display, providing he displayed during the entire three months. Pictures of the best window or floor display or of monthly displays were eligible.

Coincident with the water heater campaign was one on ranges which ran during the months of March, April and May.

● "THE HAPPY KITCHEN" was the title given to the Nevada State Journal's cooking school at Reno's Granada theatre last month in which all of the electric range and appliance dealers of Reno participated. Miss Kay Gilbert was in charge of the school for the newspaper, aided by home economists and food experts from various distributors.

YOU'RE GOING TO SAVE $ 25 A YEAR!
A PERSONAL
presentation
PICTURING THE BENEFITS OF YOUR NEW ELECTRIC RATES
presented by
PACIFIC POWER & LIGHT COMPANY

Each customer was given this card on which his own savings were written

Personalized

Every user of electric service on the lines of Pacific Power & Light Co. will have been called upon before Aug. 1 by a company representative to show him or her exactly how the new low rate will affect his particular bill. A personal presentation folder was left with each customer upon which mention was made of the cash savings under the new low rate. Emphasis was placed on the extra kilowatt hours now available at little or no extra cost.

This presented an opportunity for the representative to cover the customers' needs for additional equipment and to give a sales story concerning the particular appliance in which interest was shown. Customers called upon expressed interest in one or more additional appliances and often were surprised to find how little it cost to operate at the new low rate.

The individualized personal presentation with the figures put in for that person alone made the entire transaction a more human one and hence, more effective.

Lists of the prospects thus discovered were available to dealers or to the wholesaler's representatives in each area to take up with their dealers.

Sales Training

Modern Kitchen Bureau is producing a series of ten sound slide films for sales training courses for electric appliance salesmen. This visual "sales course" is designed for dealer meetings, individual dealers and their salesmen, small groups of dealer salesmen, utility salesmen and regular non-selling employees. Discussion manuals are provided with the films, and show how to use the series most profitably. Topics of the films are: How to build a prospect list; getting the right start; demonstrating to sell; answering objections; how to close. Product films are on refrigerators, laundry equipment, ranges, water heaters and roasters. Price of the series is based on the number of meters of interested company, and the films are available through the Modern Kitchen Bureau.

Frozen Food Tie

Bureau of Radio & Electrical Appliances in San Diego County has hit upon a novel idea to stimulate the sale of refrigerators, tying in with frosted foods distributors of that area. Begun about June 15, the Bureau is running a series of large newspaper advertisements stressing the use of frozen foods in connection with the refrigerator. Copy angle is to establish the fact that such foods can be held only through such temperatures as provided by the Bureau's refrigerators. Another copy theme, which is planned not to affect adversely the conventionally equipped models, will call attention to the separate compartments being provided for frosted foods in many deluxe models. The Bureau holds to the theory that every refrigerator salesman would benefit by learning the facts about frosted foods because, with this story clearly in mind, he can step many a sale up to a deluxe model.

● SALES PERSONNEL with the Washington Water Power Co., in Spokane, have requested a six weeks' course in public speaking through the months of July and August. This will take the place of the regular sales training program, which is discontinued until September. It is planned to have some outstanding local speaking coach in charge of class instruction. Attendance to the course is entirely voluntary. In an effort to insure regular attendance, each person registering for the course will be assessed a small fee. This fee will be refunded if the person's attendance is regular and the course satisfactorily completed.

● MEIER & FRANK CO. department store at Portland, which never does anything in a small way, launched with customary publicity its new fully equipped General Electric heating department with a showroom and shop at Union and Mason Sts. A display on the 7th floor of the Meier & Frank store downtown supplements the showroom display of oil furnaces, winter air conditioners, gas furnaces, oil burners, room air conditioning units, unit air conditioners for offices and circulating fans.

Modernizer

A successful modernization program was presented in the sales rooms of Peck Plumbing and Heating in Spokane, Washington, during May. Called a Kitchen Funfest and Radio Quiz program, the promotion was sponsored by Peck Plumbing and Heating, the Modern Cabinet Works and the Better Housing Bureau, all of Spokane. The quiz program was a regular broadcast produced in Spokane over station KGA, for the Inland Empire Manufacturers' Association, who contributed attractive prizes to the contestants.

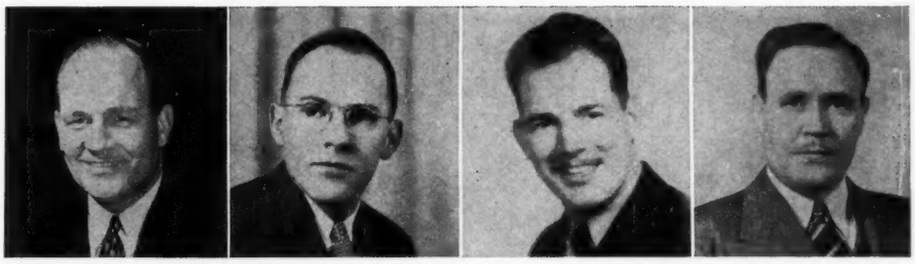
After the radio program the attention of the audience was called to the old kitchen and the new step-saving kitchen planned and built by the Modern Cabinet Works. To demonstrate the advantages of the new kitchen in contrast with the old, two men tried the convenience and the inconvenience of the new and the old by baking a cake in each kitchen. Over 160 attended the performance, which was widely publicized by radio, direct mail and newspaper announcements.

Chilliwack Wins

For the first time in the seven-year history of the President's cup sales competition of the B. C. Electric Railway Co., the Chilliwack, B. C., branch has carried off the trophy. This cup was awarded to the branch showing the highest percentage on its quota of sales for the month of May and the Chilliwack office turned in 134% of its objective. West Vancouver held the trophy last year.

The presentation of the cup was marked at a banquet tendered the branch staff at the Empress Hotel, Chilliwack, recently. E. E. Walker, light and power sales manager, B. C. Electric, presented the cup while John Taylor, chief clerk of the merchandising department, Harold Merilees, sales promotion manager, and Ralph Gram, head of the company's agricultural division, were also present.

● Low Use Customers in the Pocatello division of the Idaho Power Co. were subjected to their annual summer blitz by dealers and the Idaho Power Co. in a campaign to sell 300 hot plates and roasters from May 24 to July 24. Division Sales Manager Steve Rhoads turned loose his special character, Sel A. Watt, in the campaign. Employees were also enlisted on a bonus and prize offer.



CULBERT PATTERSON NEWLIN HARRIS

Proctorites

Pacific Coast territories and personnel for Proctor Electric Co., were announced recently by R. E. Imhoff, General Sales Manager of the company. A. W. Paterson will handle Washington, Oregon, Idaho and Montana with headquarters in Seattle. V. M. Harris will cover Utah, California and Nevada with the exception of several counties in each state. His headquarters will be in San Francisco. George Newlin will handle Arizona, parts of California and Nevada with headquarters in Los Angeles where C. P. Culbert directs the operations of all territories as western sales manager.

● Manning, Bowman & Co., Meriden, Conn., will be acquired by a newly-formed subsidiary of Bersted Mfg. Co. of Fostoria, Ohio, according to a recent announcement. The subsidiary corporation will retain the name Manning, Bowman and Co., and will be headed by John A. Underwood. This old company has been in the electrical appliance business since 1867, and has been controlled by International Silver Co. Under the new set-up, Manning, Bowman will continue to operate separately, and individual manufacturing and trade policies will be held. The company has just completed the installation of a Bakelite plant.

● "Plans for National Washer-Ironer Week, Oct. 18-25, have been called off" says *Advertising Age*. "The manufacturers aren't sure whether they will be in hot water or all flattened out by that time." They will have been put through the wringer on materials for manufacture, most likely.

● Dorris-Heyman of Phoenix, Ariz., staged a Frigidaire week last month with a cash prize of $25 to the owner of the oldest mechanical refrigerator traded in during the week, in addition to the regular trade-in allowance. A special window and floor display was conducted during the week to dramatize all of the features of the line.

● Apex-Rotarex Co. has moved its division office from Oakland to the Western Furniture Mart in San Francisco. The division office for the eleven western states is to be found on the 4th floor in the appliance section of the Mart. E. D. Hotaling, division mgr., is in charge and there also, Wm. Sheehan, district sales manager, makes his headquarters. Warehouses and service departments are still maintained on both sides of the Bay but separate from the division office.

● The Service Supply, electrical dealer for Hotpoint equipment, has recently been opened in Coeur d'Alene, Idaho, to be managed by R. K. Hildrebrandt. Besides the major equipment of ranges, refrigerators, water heaters and washington machines, the store will stock radios, vacuum cleaners, oil heaters, portable air conditioning units and small appliances.

On opening day home service advisers Sylvia Dennis and Virginia Lawson, with the Washington Water Power company, demonstrated the electric roasters, serving prepared food to interested spectators.

Campaigns

Utah Power & Light Co. and Western Colorado Power Co., July, roaster and hotplates will be featured.

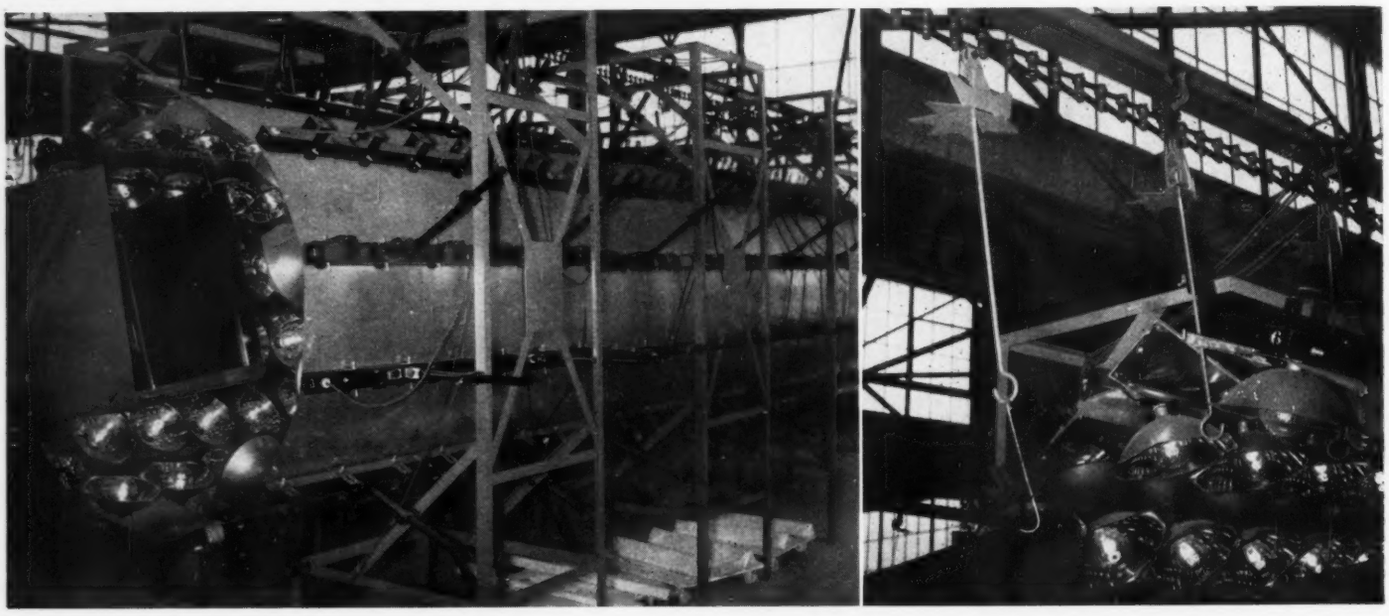
Central Arizona Light & Power Co., June-July, will feature sales promotion through dealers of air-cooling, lighting and electrical refrigeration equipment.

Nevada-California Electric Corp., July, a range campaign.

Pacific Power & Light Co., June, a rate reduction drive. Also, refrigerators and ranges will be featured. A continuation of this program is planned for July. A $480,000 rate reduction will be publicized and dealer meetings, bumper cards, bill boards, dealer price tags and banners will be utilized.

Bureau of Radio & Electrical Appliances of San Diego County, July-August, a continuation of refrigeration advertising using frosted foods theme.

British Columbia Electric Railway Co., Ltd., July, continued promotion on electric ranges and refrigerators for both company and dealer activity. In August, the annual display including separate rural display, at Canada Pacific Exhibition, Vancouver, August 25-Sept. 1st.



Metal housing around lamps at Thermador plant increases efficiency (left above.) Hinged star device (above) turns material on the conveyor hook. Below, electrically heated degreasing tank prepares metal for paint spraying

Infra-red in the West

APPLICATIONS of infra-red to drying and baking have begun in a number of interesting installations in the West during the past month or two. In each case savings, particularly in time, and as a corollary, in man-hours and often in operating costs, have resulted from this new and more flexible process. A few such applications are pictured in these pages as well as on the front cover of this issue.

Thermador sets production pace

Front cover picture illustrates one of the largest infra-red paint baking installations in the West, completed recently at Thermador Electrical Manufacturing Co., Los Angeles. It was installed by Quality Electric Co., Los Angeles, with modifications in the design developed by Thermador engineers themselves.

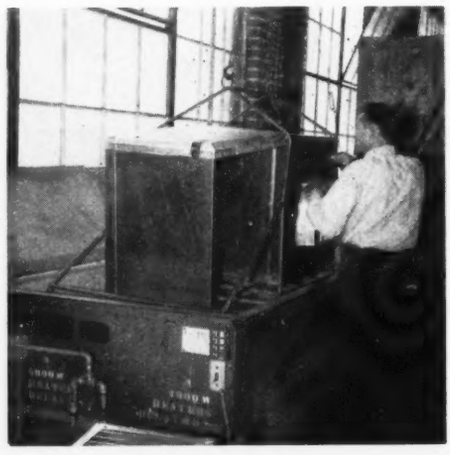
The tunnel here is 22 ft. long and contains 288 260-watt heat lamps in Fostoria gold-plated reflectors. It is used to dry the paint sprayed onto appliances manufactured in this plant. The illustration shows the drying of paint on evaporative cooler shells prior to assembly of the equipment. Twelve minutes after spraying the finish is thoroughly baked and the housing cool enough to permit internal assembly. The cover illustration shows only half of the lamps turned on for this operation. For other types of drying, the extra capacity is used.

Departure from the ordinary open tunnel of lamps is made at the Thermador installation by enclosing the lamps and reflectors in a light-gaged steel shell, which adds a convection effect to the radiant energy drying. William Cranston, jr., vice president, Thermador, estimates a 20% saving in energy by the use of this convection principle in addition to the radiant reflectors.

Another innovation here has been the development of a star-shaped device welded to the hooks from the conveyor chain upon which the sprayed material is hung as it goes through the tunnel. A six-pointed star has been made and hinged on both sides so that the points of the star may be raised if desired.

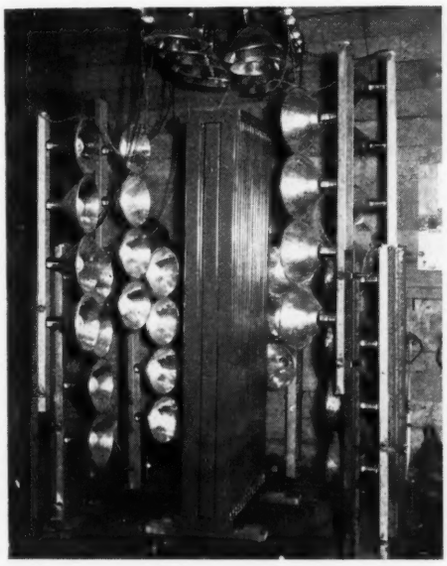
When the points are all on a horizontal plane, the material hung from the hook travels along the conveyor chain until a rod engages one of the points of the star. This causes the star and hook to turn 1/6 of a circle and with it the material hanging from the hook. Rods are so spaced that the material in traveling the 22-ft. tunnel engages the points of the star eight times. Where the type of material does not permit its turning in the tunnel because of size or shape, the points of the star are raised on the hinge as illustrated so as not to engage the rod.

Variables that have to be studied, according to Cranston, in order to get the best results from the use of radiant heat drying, are the color of the paint, density of the paint, weight of the metal, kind of metal, the bulk and shape of the object to be dried. All of these have an effect upon the job. Likewise, it was found by experience that an

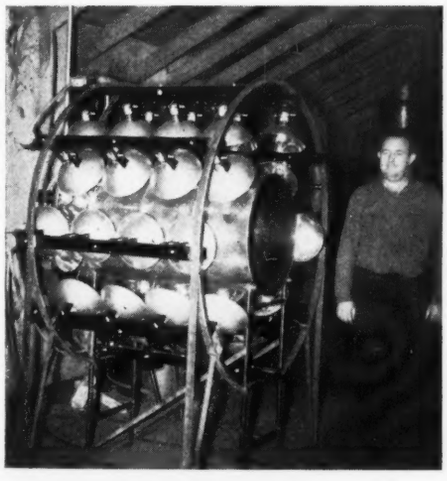


interval between the actual spraying and the time the material enters the oven is necessary to "set" the paint preliminary to its actual baking. Hence a section of conveyor between the spray booth and the oven is calculated to permit this "setting." Advantage claimed over the conventional type of oven is the saving of men, of space, and most important, of time. The pace of the oven sets the pace of production in a harmonious rhythm.

Another important factor to obtain success from this type of drying is the matter of de-greasing of the metal before it is sprayed. A special tank has been built at the Thermador factory for this purpose. In it 7 kw. of immersion heaters have been placed in the bottom of the tank. The tank is of sufficient depth to permit the complete immersion of the parts to be cleaned. A solution



Wolff Electric Co., Portland, uses 45 250-watt drying lamps on portable racks for paint drying (above). Below the first test oven at Myers Barrel Co., Oakland, and below the present double ovens with rotating mechanism



of carbon tetrachloride and other materials having a low boiling point are held in the bottom of the tank at 140 deg. F. Over the top of this solution a cool layer of water is kept to condense the vapors and prevent their escape. Under this layer of cool water vapors do not condense off into the room and the solution is used more economically. Working conditions likewise are improved. However, the solution does cut the grease in about 30 sec. and because the metal is heated by the dip into the solution, the water immediately dries off and the material can be sprayed almost immediately. This tank is equipped with thermostatic control on the heating unit and an electric pump to keep the water line at a required level.

Spraying is done in a large DeViblis spray booth equipped with a water curtain which draws the pigment and vapors into the water with extreme effectiveness. No paint spray seems to escape to surroundings and the men themselves are not required to wear masks. The spray material gathers as sludge on the surface of the water and can be removed, the water being recirculated. Lighting of the booth is done by fluorescent lamps mounted in a trough above the booth and with the light directed through wire glass covers into the booth.

Improves steel drum lining

Insides of steel drums in which fat or lard may be placed must have a tight and well bonded coating of enamel. The Myers Barrel Co. of Oakland recently installed two 12-kw. Fostoria infra-red baking tunnels to dry a sanitary liner on the inside of 55-gal. steel drums and on drumheads. So far this is the largest installation of infra-red in the San Francisco-East Bay region and was installed by Pacific Electric Motor Co. which also designed the rotating equipment.

Two tunnels consist of 44 reflectors using 260-watt carbon lamps. A drum is placed in the tunnel and rotated to give equal distribution of heat at a speed of 4 rpm. for a period of 6 min. At the end of 6 min. the lining inside the drum is baked and after cooling is ready for use. Drum rotating mechanism of both ovens is driven by one motor through a reducer and a series of belts and pulleys. The same mechanism also drives two vertical turntables on which the drumheads are placed to be baked.

Formerly it took 16 hr. to air-dry the drums and heads. Now the job is done in 6 min. and the owner of the factory is highly pleased with the results. He further claims that by former methods the exterior of the paint dried first, leaving the material nearest the steel drum soft for many hours. Often bubbles formed on the surface by the escape of gases from the subsequent drying of the inner paint. However, with infra-red the drying seems to be done from the inside out and to leave a hard nonporous surface which adds to the effectiveness of the sanitary liner for the drum.

Fluorescent

The Washington Water Power Co., in Spokane called a two-day fluorescent lighting conference for commercial representatives, June 12 and 13, in an effort to explain latest fluorescent developments and to prepare the men to serve better customers who are interested in this new source of light.

Featured talks were made by L. R. Wilson, manager of the north Pacific division of the General Electric Co., Portland, who discussed the facts of fluorescent lighting, involving flicker, long life, cost, radio interference, etc. G. F. Hain, manager of the Seattle office of the lamp department of the Westinghouse company, developed questions and answers on fluorescent; W. E. Potter, with the lamp division of the North Pacific division of General Electric told attendants of the new developments in fluorescent lighting and showed photographs of installations.

Groups of utility commercial representatives held clinic discussions on problems which they had encountered in selling fluorescent, emphasizing difficult selling situations and fluorescent lighting design problems. Twenty-nine were in attendance.

Custom-Built Fluorescent Tube

Continuous double tubing near ceiling tried both in office and factory installations

SOMETHING new in fluorescent lighting installations has been made in the Seattle territory, using custom-built "Zeon" tubing.

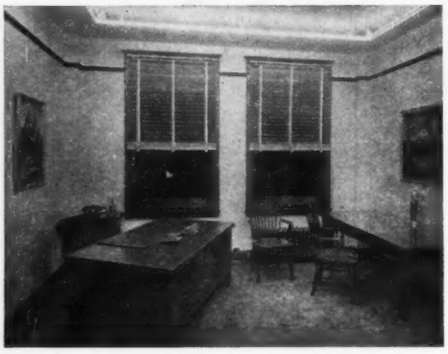
Offices of the Seattle branch of the Standard Oil Co. have just been fitted with some 4,000 ft. of the tubing to form double continuous lines of light used throughout the entire area. Excess of 25 ft.-candles is achieved at all working levels. Absence of shadows and the fact that desk lamps are eliminated are the notable factors.

Even more interesting is the installation of custom-built tubing at the plant of the Webster-Brinkley Co., Seattle, manufacturers of foundry and machine equipment and now figuring importantly in Pacific Northwest defense production. In spite of the handicap of receiving little or no reflectivity from walls and ceiling, and the fact that the light source is naturally flattened out by the presence of the masses of dark machinery, there is an even distribution of lighted area and a surprising achievement in illumination at working levels of 22 to 26 ft.-candles. Illumination has been increased three times and electrical consumption reduced one-half through the installation of the tubing source of illumination, according to the report.

A total of 2,084 ft. of the "Zeon" tubing is used in the machine shop, pictured here. Reflector-troughs are placed 8½ and 9½ ft. from the floor on the machine lines, and 12½ ft. from the floor on the craneway, placed centrally the length of the building. Diffusing shadow-free illumination at all work levels makes for a high quality of precision workmanship, it works out in experience.

The tubes are manufactured under the voltage pressure system of relationship between the voltage used and the pressure of gas in the tubes. This relationship is of great importance in a lighting installation in order, first, to gain maximum efficiency of the tubes, and second, to insure long-lived tubes of minimum dimming, according to Electrical Products Corp., which designed and made both installations.

Of course, this is not the tubing used for sign purposes. The Zeon used in the illumination system described here is especially processed first as to fluorescent coating in order to obtain a sustained light output. The coating uniformity is carefully inspected and coating results subjected to the shock test. Specially treated hooded type electrodes are used to eliminate sputter and the tubes are finally processed, using the voltage pressure system of loading. Gas pressure, proper transformer loadings, etc., were a few of the additional points that had to be considered in order to achieve fluorescent illumination systems claimed to be three times more effective than formerly.



One of the private offices at Standard Oil Co., Seattle, above, using the double tubing in a rectangle around the ceiling. Photo was taken without other illumination and shows the even distribution of light throughout

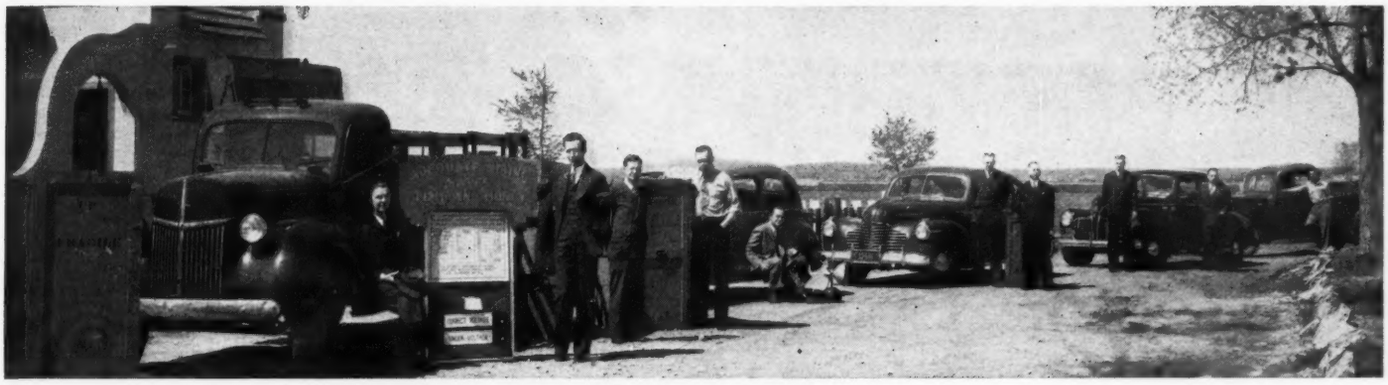
★

Below, at left, a view of the machine shop at Webster-Brinkley Co., where reflector troughs are placed 8½ and 9½ ft. from the floor. In an adjacent area, in which a crane operates, the trough and tubing was mounted 12½ ft. from the floor above the craneway. Reduced specular reflection on shiny metal is found to be an advantage. At right, another view in the Standard Oil building. Transformers for the tubing are in metal housings near the columns, seen at the extreme right

● ACHIEVEMENT in Red Seal wiring of new homes and in installation of major electrical appliances reached a new high in 1940 in the Pacific Gas and Electric Company's San Jose division, according to recent sales department reports.

This division includes Santa Clara and San Mateo counties. Building records of the two counties show that 2960 new homes needing electrical service were constructed. This was a twenty percent increase over 1939. Of these new homes, 263 were certified for Red Seal wiring, 180 were equipped with electric ranges, and 103 with built-in type of electric air heaters.

The division employs eleven salesmen devoting their entire effort to promoting Red Seal adequate wiring and the installation of ranges, water heaters, air heaters, and other electrical appliances.



ADEQUATE WIRING caravan of Rocky Mountain Electrical League starting on its tour of the mountain region. It tells in word, picture, chart and demonstration the story of wiring adequacy and fluorescent lighting. Guided by T. M. Foulk, contractor, chairman of the League's wiring bureau, R. N. Hankins, chairman of the commercial and industrial lighting division, and members of both committees participate in programs to architects, builders, electricians and others

New Attack

Financing agencies told their interest in wiring

COMPLETELY new was the approach to adequate wiring — the financing angle—presented by Arthur E. Schanuel, field representative, National Adequate Wiring Bureau of New York on his tour of the West this time. Those communitise which caught the idea in time to bring important banking and home loan financial men to his meetings, undoubtedly will find the going much easier in the months to come. Schanuel's tour began at Denver as far as the West was concerned, swung into Idaho, down to Utah, then to Arizona, southern California, northern California, the Pacific Northwest and back through Montana and Denver.

Most spectacular of the meetings from the standpoint of this new approach were those at the Los Angeles and the San Diego Electric Clubs. Of these two, among the 175 in attendance, the Los Angeles Club on June 9, drew top men in the home building and and financing field.

The ballroom of the Biltmore was decorated with billboards such as the Southern California Edison Co. and Bureau of Power & Light display on homes being wired to certified standards. The Edison Co. model home display (See ELECTRICAL WEST, Sept., 1940, p. 54), was placed at the door. A double length head table was required to seat the 24 prominent architects and builders brought to the club as guests of the two utilities. These men were introduced individually in a brief comment made about the way in which each was tying in with the adequate wiring program.

Among the prominent executives at the head table were the following: J. H. White, district manager, Electric Home and Farm Authority; Horace S. Wilson, president, California Savings and Building Loan League; Hamilton Patton, executive vice president, First Federal Savings & Loan Assn.; F. D. McDonald, Jr., manager Southern California Home Show; Wm. O. Harris, manager, Home Builders Institute of America; Horace Shidler, president, Southern California Home Builders Assn.; E. B. Morgan, secretary-treasurer, Residential Research Commission; V. H. Rossetti, president, Los Angeles Clearinghouse; E. A. Dickson, president, Western Federal Savings & Loan Assn.; R. C. Willis, production manager, Federal Housing Administration; Neil Petree, board of directors, Los Angeles Chamber of Commerce.

Every important branch of home planning, financing and building was represented. Many of the Electric Club members had as guests architects, builders or men engaged in home financing.

"The dollar is on the breadline looking for a job," said Schanuel in his talk directed specifically to the home financing interests. He contrasted the old methods of financing homes on three-year mortgages covering only 40% of the investment as against the present 15, 20 to 25 year mortgages covering as much as 90% of the investment, wherein the banker or financing agency must expect the home owner to repay in small payments month by month during that entire period. Dissatisfaction with the living qualities of the home (among which adequate wiring is considered the second most important by surveys of recent home buyers), creates the necessity for a type of insurance to the banker that the electric system installed will not become obsolete before the mortgage is paid.

Refreshing their minds as to the tremendous increase in usage of electric appliances since the depression and the comparative slow increase in other home requirements, Schanuel drove home the point by asking, "Will the electrical system in this house stand up to do the electrical job that people want to do in that house in its 15, 20 or 25 years of existence?" When the electrical industry provides a minimum standard, he emphasized what an assurance and guarantee it is to the lending agency.

To follow up those in attendance, a letter was written by Victor W. Hartley, managing director, Pacific Coast Electrical Assn. In it he reminded the recipient with a list of the benefits enjoyed in an adequately wired home by the financing agency, the architect and builder, and mostly by the owner. Further follow-up of the interest aroused is planned.

At San Diego Electric Club Schanuel addressed a similar group of bank and lending agency representatives invited by Charles Davies, manager of collections, San Diego Gas & Electric Co.

At Twin Falls and Boise, Ida., where two meetings were held, the leading architects, the designing staffs of the lumber companies interested in home building design, and the lumberyard managers were likewise told the story by Schanuel. W. Hopper, chairman, Adequate Wiring Assn., presided.

In Utah meetings were under sponsorship of the Electrical League of Utah and Gordon Wegeland, state director FHA, was present. Two meetings in Douglas and Miami, Ariz., were attended by 120 and 60 respectively and included builders, financial houses and the electrical industry.

On the return trip, the Rocky Mountain Electrical League plans another special meeting for bankers on July 2 at which G. B. Buck, president of the League, will preside.

LIGHT for LIBRARIES

Incandescent

Who

Engineering by Ladner Ross, illuminating engineer, Washington Water Power Co. Brown- Johnston Co., electrical contractor, Spokane.

The Need

Adequate illumination for reading and study.

Conditions

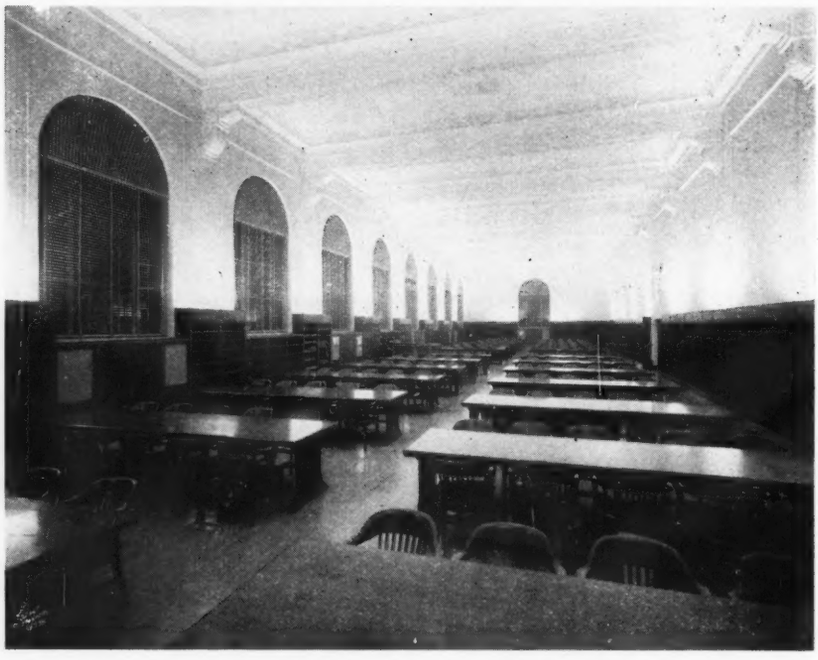
Room 40 x 146 ft, 26-ft ceiling. Walls and ceiling light cream, high reflection value for totally indirect cove lighting.

Installed

At each pilaster a group of four 500-watt Curtis 5105 reflectors, 80 total. To reduce daylight glare from large south exposure windows, blue glass was installed.

Results

Uniform shadowless illumination on tables of 45 ft-c.



Where Eastern Washington College at Cheney

Incandescent

Where Ontario Public Library, Ontario, Calif.

Who

Lighting engineer, Warren Smith, Southern California Edison Co.

Conditions

Two main reading rooms and vestibule, irregular in shape, 13-ft ceilings, with dark wood beams. Formerly had 5 ft-c from enclosing glass fixtures. Dome over vestibule.

Installed

Light colored accoustical ceiling below the beams and 500-watt Westinghouse Magnalux fixtures, with approximately 80 sq ft per outlet.

Results

Initial intensity averaged 50 ft-c; expected maintained level 35 ft-c.

Before

After

Mercury and Incandescent

Where University of California at Davis, Calif.

Who

Electrical and illuminating engineer, G. M. Simonson. Fixture design by Preston Hopkins. Roy Butcher, electrical contractor.

Conditions

Ceiling 28 ft. high, with ornate decoration of low reflection factor. Room 50 x 145 ft.

Installed

Special fixtures with opal glass panels concealing a 1000-watt bi-post incandescent lamp and a 400-watt Cooper-Hewitt mercury vapor lamp in circular tubing. Total 27 fixtures. Auxiliary located above ceiling.

Results

Initial intensity 45 ft-c, sustained 35 ft-c. Mercury vapor light adds blue to incandescent spectrum. Results uniform. Difficulty experienced in silencing auxiliary and adjusting both light sources to each other at first.

EMEA *Dope Sheet* — *Edited by Howard C. Park*

EMEA of So. Calif.

The Job to do

Maintenance engineer should be conversant with all this

[First of a new series]

Maintenance has been variously considered or treated as anything from a nuisance to a necessity.

When maintenance is considered or treated as a nuisance usually the work done amounts to little more than trouble-shooting.

When maintenance is considered as a necessity it becomes a function which substantially contributes to the processes of production.

The extent to which maintenance is performed—or permitted to be performed—may, no doubt, be due to the viewpoint or concept of what maintenance is.

What Is Maintenance?

The title "maintenance" is, of itself, quite confusing or misleading. It tends merely to imply upkeep. However, the function of maintenance as applied and practiced in modern industrial and production properties could more properly be termed industrial electrical engineering. But, since maintenance is the title that has been more commonly accepted, the concept of maintenance may be clarified by setting forth a definition and describing the functions of maintenance.

Definition of Maintenance

Electrical maintenance is the art of employing industrial and electrical engineering to provide services which will economically facilitate the processes of industrial production and commercial services.

Functions of Maintenance

The function of maintenance in industrial plants and commercial properties is that of supplying services; to select, install, keep in dependable working condition, and (in some cases operate) the equipment required to provide mechanical power and electrical energy economically to facilitate productive operations.

The following may be said to be the twelve functions of maintenance:

1—Keeping posted on new and improved methods and equipment.
2—Selection and application of equipment.
3—Proper and adequate service and equipment installations.
4—Provide flexible installations adaptable to changing requirements.
5—Adequate preparations to meet any emergency.
6—Keeping equipment in good working order.
7—Keeping complete records of electrical equipment and power system.
8—Knowing and keeping records of conditions, capacities and loads of equipment and power system.
9—Analyze and control electrical department costs.
10—Analyze and control power costs.
11—Know and understand plant production processes.
12—Have constant regard for safety.

It is difficult to say which of the functions of maintenance are of the most importance. However, probably, more functions are dependent on the knowledge of the capacities, load, and conditions of the power system and operating equipment than any other single factor. Since the data required to furnish such information is so vast; means and methods of systematically compiling such information are necessary. The following, may serve as a guide to assist in forming an outline for compiling the important information required.

General System Information

The following general system conditions or factors concerning supplied potential, current consumption, secondary circuit voltages, and power schedule should be known or ascertained:

Total system connected load.
Power factor of system.
Maximum power demand.
When maximum and minimum power demands occur and of what duration.
Actual voltage of power supply line.
(Voltage and voltage fluctuations should be known over entire twenty-four hour period, including week ends.)
Actual voltages supplying power and lighting circuits.
Provisions of power schedule in effect.
Provisions of other applicable power schedules.
Load factor, hourly, as well as monthly.

Power Supply

What is source of power supply?
How dependable is source of power?
Is power available through more than one supply line or power source?
Is power source adequate for any possible requirement?
Would auxiliary power be advisable for emergencies or peak loads?

Transformers

What is type, rating, and capacity of distribution transformers?
Are transformers of correct type, rating, and capacity for load serviced?
Would different type or design prove more economical?
Would it be advantageous to use air-cooled transformers on present high voltage feeders to serve lighting circuits?
What are primary and secondary transformer conections?
What voltage ratio taps do the transformers have?
What voltage ratio taps are in use?
Are transformers adequate for possible future loads?
Are transformers located at economic load center?
What are the operating temperatures of the transformers?
Are transformers clean and proper ventilation provided?
What is condition and dielectric strength of insulating fluid?
How is the insulation resistance of the windings?
What are primary and secondary voltages?
Is the capacity of current carrying connection equipment ample?
Are transformers properly protected against overload and lightning?

Service Equipment

Is service equipment capacity ample for any possible requirement?
What are the sizes, capacity, and length of service feeders, etc.?
What is the method of system grounding?
What is the maximum capacity of system grounding circuit?
What is type, kind and capacity of service switch?
What is type and capacity of overload protective device?
What is present setting or rating of overload protective device?
Is service switch in good mechanical operating condition?
If oil switch, what is its condition and dielectric strength of oil?

Main Switch Board

What is size and current carrying capacity of busbars or conductors?
What are the sizes and capacities of distribution switches?
Is each switch clearly marked, indicating feeder or load serviced?
How many switches are in use?
How many and what size spare switches are available?
What space is available for adding more switches?
Is a ground detector device provided?

Next month, what the maintenance engineer should check in regards to the distribution system in his plant or building will be suggested in this same manner.

ELECTRICAL WEST

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Same Thing For Same Money

WHEN James H. Polhemus, president of Portland General Electric Company, a few months ago defined practical business competition as "selling the same thing for the same money," he presaged a new era of rate making in the Northwest. As expected, his company put into effect last month new schedules based on overthrow of the long-accepted "postage stamp" theory of uniformity of rates throughout a wide area, in which it is admitted that cities and congested districts help carry thinner rural business. From now on in PGE territory cities having comparable conditions as to cost of service will receive equal rates based on those costs, but some cities will have lower rates than others and rural areas will take the highest rates. For instance Salem now has the lowest rates in the company's territory. Four or five other smaller communities in the vicinity have a slightly higher rate, and all other incorporated communities in the two counties thus far studied have still higher schedules, while the farming areas have the highest. Each schedule is obtained by applying a "locality surcharge" to the objective rates proposed by the Bonneville Power Administration.

Explanation for the change is that PUD's and municipals distributing Bonneville power use this rate making theory, each locality charging rates based upon variations in cost with the final charge to the consumer consisting the Bonneville rate plus a surcharge. Mr. Polhemus states that in order to compete with this situation, it will be necessary for the company to adopt the same practice, since it is recognized that costs are not uniform throughout the widespread territory served by the company. Hereafter each community will presumably stand on its own feet and pay such rates as will defray the particular costs applicable to serving it alone.

There is considerable speculation in utility circles as to what will be the public reaction to these new rates. Those who receive reductions will undoubtedly be pleased. But what of the others who are not so favored, or who may in the long run have to take a rate increase? Will the theory be tenable? Will it be understandable by the public? And, will the public accept it? These are the questions which utility people are asking and which will be answered only by time. Thus far, however, few unfavorable reactions have developed, and the press of the territory, by and large, has been cooperative in aiding the company's educational campaign.

The philosophy behind this move contemplates that this is the only method to meet successfully the competition offered by Bonneville-served municipalities and PUD's. It is, in short, according to the company's thinking, the only way to forestall the gradual whittling away of the PGE system into public ownership parcels. The experiment will be watched with great interest.

Unity Not Made This Way

CONFUSION and dissatisfaction are least wanted during a national emergency. They can be tolerated as a price to pay for democracy at other times, but in emergency the deep need is unity. Such unity is not promoted by asking for it over the radio yet permitting other agents of the government to goad and knife those who are asked to unite. Not even in the interest of reform is such confusion making justified.

Specifically, when the administration asks for all-out cooperation from business, the machinery for the best cooperation should be found in the business association. But to attempt to accomplish anything cooperatively through an association is to invite Thurman Arnold to wheel up the Sherman anti-trust law equipped with new long range interpretations to blitz any associated activity, even if it be in the national interest. Under the newer interpretations of how far interstate commerce goes there are no state lines any more, so the indictment-gunning can be done indiscriminately. By such two-faced tactics unity is not made.

Forty-four of the 48 states have adopted fair trade or unfair practice acts. That must indicate their necessity in modern economic life. What is

needed is an overhauling of the Sherman Act to bring it up to date with the times too. An excellent suggestion comes from an attorney who has had much trade association experience. He suggests this:

Amend the act to permit a trade group whose interests may affect interstate commerce to file a petition in the local district court which would have jurisdiction over all parties, asking for declaratory relief, setting forth the purposes for which the association was to be formed. Legally advertised, etc., submitted to the U. S. District Attorney, a hearing would be held, the matter thoroughly debated, and a court judgment rendered as to what the association could legally do. Local conditions could be considered. Subsequent changes could be brought about in the same court, and a public record of all such purposes and practices be maintained.

Perhaps the NRA went too far, shifting police powers to trade associations. Let police power remain in the courts, but certainly let the old Sherman Act be modernized so that practices that make a new type of monopoly by piracy can be restrained. When the nation desires unity so urgently this internal sabotage of business should be stopped too, and quickly.

Banks and Adequate Wiring

FOR YEARS the industry has preached and shouted, begged and wheedled, praised and damned the need for adequate wiring. Progress has been slow. Those to whom the pleas have been addressed were pressed by another factor in such a way as to make it difficult, almost impossible, to install the adequate wiring the industry needed. That factor was the customer's willingness to pay what good wiring was worth. And in many cases the customer's willingness to pay depended upon his ability to finance the added cost.

Now at last a genuine effort is being made to reach that hidden factor—the financing. Fortunately, as Arthur Schanuel of the National Adequate Wiring Bureau revealed to the industry groups he addressed on his tour last month, the long term, small payment, full mortgage amortization of homes under FHA has placed the financing agency or bank in a new position. It must live with that house 20 to 25 years until it is paid off, because the bank's share in its financing is a substantial one. The tenants must be willing to keep paying during its long life. Wiring inadequacy causes complaints and endangers that long investment.

When this view is realized by the financing agencies they see their stake and want to insure their investment by adequate wiring. The added cost is so little, spread over a long period, that they will assist this industry where it will do the most good—in the financing when they are told their need for such protection.

Credit Watchfulness

NO TROUBLE at all selling merchandise these days. The trouble is to obtain stcok. As one manufacturer declared, "When the buyer from one of the largest stores in the world comes to the factory himself and begs for merchandise, that's something."

But the credit men are not jubilant. Their eyes look farther ahead and forsee some of the strains that may come when the full impact of defense taxation hits this public that is loading itself up with time payments. Something will have to give, and it will not be the U. S. Treasury.

While nobody can get together with anyone else these days to do anything about it—that's illegal if not reprehensible—those who know what is good for their own survival are likely to tighten up on terms very soon. The article on page 37 by financing authority H. Garfinkel should be read and thought about intimately by every dealer and distributor, even though business is booming so furiously today.

"MODERN war is a battle of equipment that takes raw materials, power, transportation, manpower, and more than anything else, mechanical ingenuity. Therefore we in America are potentially better equipped than any other country in the world. The will of our production people to win this battle of equipment is the prime factor in the battle. We have the materials, the machines and the men. American industry and workers have never failed their country in an emergency and they will not fail now . . . If defense of freedom and the democratic system of government means sacrifices, then no sacrifices are too great. We must preserve our freedom and protect our country which under our system of government produced the highest standard of living in the world . . . We often hear that the totalitarian people deride our efforts and say results cannot be obtained except through fear and conditions bordering on slavery. America will show them that work and thrift, love of freedom, and good will, will carry the flag further and produce better results in the end.—William S. Knudsen, director general, Office of Production Management.

Inspectors Announce Convention Agendas

AGAIN the program of the convention of the Southwestern Section, International Association of Electrical Inspectors will be designed around those field problems about which the inspectors want to get more information. Such a program was successful last year and both President O. W. Newcomb, Long Beach chief electrical inspector, and Secretary Harold L. Gerber, chief electrical inspector, San Francisco, have announced this as the prevailing motive in the San Jose convention Aug. 25-27, 1941, at Hotel De Anza.

Two days of the program will be devoted to speakers assigned these special topics. The final day will be devoted to article by article reports and discussions of National Electrical Code changes submitted to the clearinghouse committee for handling at the convention.

Highlights of the program are as follows:

Monday morning, business session, addresses of welcome and presidential addresses of Geo. E. Kimball, president IAEI, electrical engineer, California Industrial Accident Commission; and section president Otis W. Newcomb. Also, report of secretary and officers, chapters, etc.

Monday afternoon, "Power factor correction on customer's circuits" presented by Frank Talcott, sales manager, Pacific Gas & Electric Co., San Francisco.

"Inspectors' problems," discussion leadership by R. H. Manahan, chief, Division of Electricity, Los Angeles, and member of the executive council.

"Cellular floor raceways" by Joseph J. Siddall, electrical engineer, H. H. Robertson Co., Pittsburgh.

"Nontamperable types of fuses, their characteristics and design," a subject not yet assigned.

"Circuit breaker protection for lighting, appliance, and small motor circuits" by Charles Dean, engineer, Westinghouse Electric & Mfg. Co., San Francisco.

"Mercury vapor lighting and auxiliary equipment" by R. E. Lagerstrom, General Electric Lamp Dept., Oakland.

Tuesday morning—After a "code breakfast" the meeting will consider these subjects:

"Gaseous luminous tube lighting" by someone from the Electrical Products Corp., Oakland.

"Recessed lighting fixtures — construction and installation problems" by R. H. Dummel, the Holophane Co., San Francisco.

"Busways—construction and application" by A. A. Schwartz, Safety Electric Co., San Francisco.

"Public Relations for the inspector" by J. W. Whittington, chairman National Public Relations Committee.

"Relations between Underwriters' Laboratories and the inspector" by R. B. Shepard, electrical engineer, Underwriters' Laboratories, New York City.

"Voltage drop in interior wiring installation" by Arthur Abbott, uniform legislation department, National Electrical Manufacturers Assn., New York City.

Tuesday afternoon will be spent on a tour to include the Ryan high voltage laboratory at Stanford University and possibly to some defense projects, arrangements for which have not yet been completed.

Wednesday morning, the reports of the articles committees on the 1940 Code will be heard and the report of the clearinghouse committee upon recommended changes as well. This session will continue into the afternoon, terminating with the election of officers and selection of meeting place for next year.

Committees in charge of the annual meeting are headed by H. Snedaker, chief electrical inspector, San Jose, as chairman. Other committee chairmen are as follows:

Finance, H. L. Gerber, San Francisco; *reception*, J. I. Dixon, Santa Clara; *information and registration*, Mrs. J. I. Dixon, Santa Clara; *hotel*, A. V. Youens, Palo Alto; *publicity*, W. A. Cyr, ELECTRICAL WEST; *photograph and badges*, R. B. Maxwell, assistant city electrician, San Jose; *transportation*, William L. Grear, PG and E; *exhibits*, Henry J. Guilbert, Guilbert Electric, San Jose; golf, R. H. Rundle; *social*, Henry A. Arth; *program*, H. L. Gerber; *entertainment and trips*, Roy Butcher, electrical contractor.

An exhibit of manufacturers' new materials of interest to inspectors and contractors will be held in conjunction with the convention.

Arrangements are being made to hold a joint meeting with the Electrical Contractors Assn. of Northern Calif. for one of the sessions. In that event, the contractors will hold a short business meeting and then devote the rest of their time to the inspectors' convention.

Northwesterners

Wiring table changes proposed as an interim revision of the 1940 National Electrical Code were not passed as such by the Electrical Committee, NFPA but referred back to the Committee for further consideration. For that reason the subject of the wiring table changes is likely to be the predominant one at the Northwestern Section convention of the International Association of Electrical Inspectors to be held at Hotel Winthrop, Roof Garden, Tacoma, Sept. 2 to 5, according to Fred D. Weber, secretary-treasurer. The main theme of the convention will center around defense work but the wiring table discussion will probably be the most vital subject under discussion. The program as tentatively outlined by Secretary Weber is briefly as follows:

Tuesday morning, open business session with addresses of G. E. Kimball, president IAEI, San Francisco; I. B. Sturges, Northwestern Section president, Portland. Address of welcome by R. D. O'Neil, Commissioner of Public Utilities, City of Tacoma. There will be secretaries' reports and reports from chapters and a preview of the Underwriters Laboratories' new field laboratory presented by R. J. Larrabee, field engineer.

Tuesday afternoon, beside starting with article committee reports, will have as speakers:

"Public relations for the inspector" by J. W. Whittington, chairman National Public Relations Committee, New York City, with a supplementary report by Capt. S. E. Sanislo, the colorful fire chief of Seattle, with his siren call.

"State Electrical Bills" by G. A. Sawin, director, regulatory legislation department, NEMA, New York City.

"Seattle's Blackout" by M. T. Crawford, asst. chief engineer, Puget Sound Power & Light Co., Seattle.

Wednesday morning will begin with a code breakfast and continue article committee reports. In the morning, however, will be two talks:

Recent Interpretations of the National Electrical Code" by V. H. Tousley, secretary, IAEI and field engineer NFPA.

An address by A. R. Small, chairman of the Electrical Committee, NFPA and president of Underwriters Laboratories, Chicago.

Wednesday afternoon, more article committee reports and the following talks:

"Cellular Metal Floor Raceways" by J. J. Siddall, electrical engineer, H. H. Robertson Co., Pittsburgh.

"Underground Installation of Conductors" by S. B. Clark, Northwestern Electric Co., Portland.

"Voltage Drop in Interior Wiring Installations" by Arthur L. Abbott, uniform legislation department, NEMA, New York City and author of the National Electric Code Handbook.

"The National Board of Fire Underwriters —Its Scope and Activities" by Lewis A. Vincent, assistant secretary, National Board of Fire Underwriters, New York City .

An address by George Wisting, assistant general manager, Northwestern Electric Co., Portland.

Earl Malmgreen, chairman, Southern California Chapter, IAEI and Herbert Ufer, secretary at Long Beach meeting

Among the article committees will be two special committee reports, "A Study of Wiring—Outdoor and Field," by L. W. Going, chairman. and another, "Wiring Standards for Auto and Trailer Camps," by E. E. Lee, chairman.

Wednesday evening, a clam bake will be held at at Point Defiance Park.

Thursday morning will begin with a code breakfast and continue article committee reports all morning.

Thursday afternoon, article committee reports will be continued.

Thursday evening the annual dinner dance at the hotel.

Friday morning will continue article reports and other special committee reports; with the final business session, election of officers and determination of next meeting place on *Friday afternoon.*

In addition, however, General Chairman W. L. Gaffney and his committee are looking well to the entertainment side and are particularly urging members to bring their wives, golf clubs and fishing tackle. Numerous side trips and special events are being arranged for the spare time of the session.

A particularly impressive display of exhibits is being organized for the visitors who will be attending from as far north as Alaska and as far south and east as Salt Lake City.

I. B. Sturges, Portland, is the Section president and F. D. Weber, Portland, is secretary-treasurer. Gaffney, chief inspector, Tacoma, as general chairman, is the section's first vice president. Convention committee assistants are: C. M. Kirsop, Olympia, Wash.; Wallace Morrissette, Tacoma; E. G. S. Pryor, Seattle; and F. D. Weber, Portland.

Portable?

"What is a portable" was a problem discussed by the Southern Calif. Chapter, International Assn. of Electrical Inspectors at the May 21 meeting in Long Beach. The subject came up in several different aspects. Frank Short, electrical engineer, Industrial Accident Commission, Los Angeles, talked on the subject from the standpoint of necessity for grounding of portable equipment to cut down fatal accidents. Several such accidents have occurred recently because the grounding conductor is not maintained on portable tools and because the fittings made for connecting to ground do not stand up under rough usage.

C. A. Veit, county electrical inspector, Los Angeles County, submitted drawings of standards for portable service equipment on construction projects. These standards were drawn up in cooperation with the Industrial Accident Commission and are now to be issued for the guidance of builders and others setting up temporary power for the use of portable tools on a construction job. ELECTRICAL WEST will print these standards in an early issue

Meeting was presided over by Earl Malmgreen, Alhambra electrical inspector, chairman of the Chapter. It was also addressed both by IAEI President George Kimball, San Francisco, and Southwestern Section President Otis W. Newcomb, Long Beach chief inspector, who was host to the meeting. Next meeting will be held in November at Torrance, Calif. The afternoon session was devoted to the demonstration and talk on wire sizes and capacities and adequate wiring in general by A. B. Smedley, Los Angeles district manager, Anaconda Wire and Cable Co.

Jerry Ellis, vice president, Glenn Farr, president of EMEA, and last month's speaker, W. P. Edgecomb, Westinghouse

EMEA on Tests

Various special services useful to the electrical maintenance engineer were discussed and demonstrated at the June 17 meeting of the Electrical Maintenance Engineers' Assn. of southern California at Scully's, Los Angeles. Glenn Farr, RKO studios, president of EMEA presided. The meeting was in charge of the Quality Electric Co., the president of that company, J. O. Case, handling the program.

"Some useful test equipment for the maintenance engineer" was presented by C. C. Adams, electrical engineer. In it he illustrated and used several types of test instruments, tachometers, meggers, etc.

"Infra-red — the sensational new method of drying, baking and dehydrating" was next presented by Joe Case himself. Recent installations of the method were described and discussed as to their effectiveness.

"Overcoming heating losses caused by contact drop in electrical circuits" was then presented by Adams who showed by means of instruments the losses caused by poor contact of switches, bus connections, etc. Use of a portable silver or cadmium plating equipment to improve the contact points on equipment in the field was shown.

Dividend Pays Dues

A dividend of $2,975.87 was disbursed among the 13 participating members of the Los Angeles Chapter, National Electrical Contractors' Assn. who, as a means of financing the association more than a year ago, pooled their compensation insurance under a group insurance plan with the State Compensation Insurance Fund. This dividend was $1,010 more than the members would have received as individual policy holders and represented an average refund of over 46% of their annual dues. The refunds ranged from a low of 5.8% to a high of 100%. The largest check, amounting to $1,020.63, went to Pacific Electrical & Mechanical Co.

Entered into somewhat dubiously as a means of providing finances for the chapter, careful study was first made of its effect in other groups in the oil, citrus, cement and lumber industries. On July 1, 1939, a policy was issued the chapter and only 13 of the more intrepid members participated. Then came the wait of 21 months until the first dividend would be due.

Although the premiums were pooled for purposes of securing a larger refund, no member of the group was deprived of the advantages of his own experience rating. A reduction in the basic rate to which he would be entitled as an individual for a good safety record was automatically allowed under the group policy.

The last meeting of the Los Angeles chapter had as its featured speaker A. B. Smedley, district manager, Anaconda Wire & Cable Co., who presented one of the most workmanlike and practical discussions of adequate wiring and the new wire carrying capacities. A. L. Stone, recently re-elected president of the chapter, presided.

Under the joint sponsorship of this chapter, local union B83 IBEW, Los Angeles Board of Education and the apprenticeship division of U.S. Department of Labor, the first apprentice class of 37 apprentices were given a graduation exercise at the Frank Wiggins Trade School and presented journeymen trade certificates. Geo. DeAth, chairman of the apprenticeship committee, delivered the "baccalaureate" and diplomas were presented by Geo. E. Ellicott, vice president Trade Apprenticeship Council and business manager of the local union.

New IES Chapter

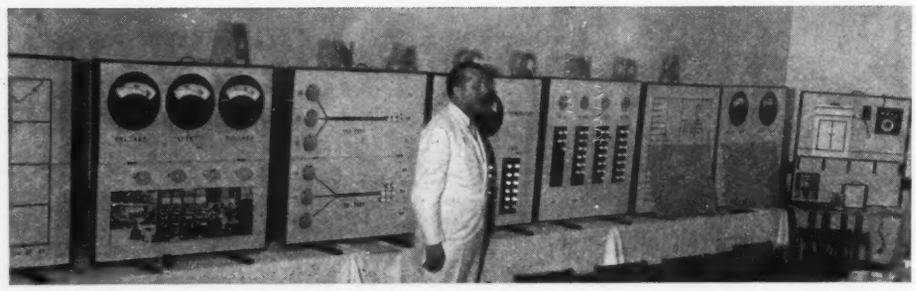
More than 50 lighting experts convened in Denver, June 13, to form the Rocky Mountain chapter of the Illuminating Engineering Society. Membership was drawn from Colorado, Wyoming, New Mexico and sections of South Dakota. Guest of honor was P. M. Rutherford, Jr., Dallas, Texas, vice president of IES, who came to accept the local body's application for a national charter. R. N. Hankins, regional representative of IES, and G. B. Buck, Rocky Mountain Electrical League's president, presided jointly at the founders' meeting. Mr. Hankins was elected chairman; William B. Carroll, secretary-treasurer; Harold A. Rankin, George E. Lewis and Arthur J. Walter comprise the executive committee.

● J. A. TAMES was the unanimous choice for president of the Vancouver, B. C., section of the American Institute of Electrical Engineers, his election taking place at the thirtieth annual meeting of the group held recently. Tames replaces J. H. Steede as president. T. L. Hadwin was named vice-chairman; F. V. Knight, secretary; and J. H. Steede and V. W. M. Foracre, members of the executive committee. Auditors appointed were R. Lvon and C. Arnott. The report of V. W. M. Foracre showed a membership of 102. Those who had joined the active services were given membership privileges in the institute.

● PACIFIC COAST WHOLESALERS, members of the National Electrical Wholesalers Association, will hold their fall convention at Hotel Del Monte, August 28-30. This will be the first meeting under the two-sessions-a-year plan recently adopted by the group. Newly elected chairman D. A. Smith of Graham-Reynolds Electric Co., Los Angeles, will preside.

● THE ROCKY MOUNTAIN ELECTRICAL LEAGUE'S regional meeting in Albuquerque, June 17 and 18, was devoted entirely to fluorescent lighting. Subjects discussed included: "Pitfalls of Fluorescent Lighting," "Selling Fluorescent Lighting on its Merits," "Calculating Fluorescent Lighting Jobs, Intensities, etc." and "How to Specify Proper Colors."

T. M. Foulk, chairman of RMEL's adequate lighting bureau, and R. N. Hankins, chairman of the League's commercial and industrial lighting committee, arranged the meeting in collaboration with Arthur Prager, manager of the Albuquerque Gas & Electric Co., and his assistant, H. L. Pinkerton.



A. B. Smedley, of Anaconda Wire & Cable Co., Los Angeles, with the demonstration equipment used in his unusual and instructive wiring talks to EMEA, IAEI and NECA groups in Southern California during the past two months

Meetings

Pot & Kettle Club, San Francisco, June 13, election of officers was held and L. W. Sauer was chosen as chairman, Homer Wilson, first vice president, J. Jackson, second vice president, Frank Overbeck, third vice president, Fred Wigmore, corresponding secretary, George Koch, treasurer.

Electrical League of Utah—Special meeting May 22 in conjunction with Utah Chapter, International Assn. of Elec. Inspectors, to present to electrical contractors and wiremen A. E. Schanuel, field representative for N.A.W.B. and subject, "Prosperity for the Electrical Industry Through Adequate Wiring." "New Demand for Home Ownership" presented by Mr. Schanuel at regular monthly League meeting, May 28, before architects, building contractors and F. H. A. officials. Board of Trustees meeting held June 18 for discussion of Annual League Outing, scheduled for August. Ogden Electrical League monthly meeting conducted June 5 when the subject, "National Defense and Appliance Sales," was discussed. All regular League meetings will be discontinued during the summer months.

Black Hills Electrical League, which comprises Rapid City, Deadwood, Lead and adjacent localities in South Dakota, has become a part of the Rocky Mountain Electrical League. Affiliation with the League was authorized at a recent meeting in Rapid City attended by chairman R. N. Hankins of the lighting division and manager Geo. E. Lewis. Marion M. Wilson of Rapid City is president of the chapter; Charles B. Marshall, Deadwood, is vice president; Lloyd Caulkins, Custer, is treasurer, and E. E. Clark, Rapid City, is the new secretary.

Electric Club of Los Angeles, May 26, H. V. Putnam, Westinghouse Electric & Mfg. Co., "The Westinghouse profit sharing plan for employee relations".

Electric Club of Washington, June 2, Seattle, Lt.-Com. Eric Hall, "The United States power squadron and the part it plays in the defense of these United States".

San Diego Electric Club, June 3, A. E. Schanuel, National Adequate Wiring Bureau field representative, led a discussion of adequate wiring and prizes were awarded to members displaying the most "adequate wiring knowledge." June 10, Robert Zumwalt, Benson Lumber Co., presented a motion picture "Trees and Homes".

East Bay Electric Club, May 23, in a joint meeting with the East Bay Engineers' Club Albion Ross, foreign editor, San Francisco Chronicle spoke on "The Axis shadow on the Pacific."

Electric Club of San Francisco, June 2, E. O. "Bill" Shreve spoke on "Some of industry's problems and opportunities." June 16, Al Nicoll, vice president and director of Gray-Bar Electric Co., New York, spoke on "The effects of defense on the electrical industry." June 23, R. E. Fisher, vice president Pacific Gas and Electric Co., chairman National Sales Committee, EEI, gave a report of the EEI convention in Buffalo, N. Y. June 30 was radio day with both San Francisco and East Bay Electric Clubs participating. NBC radio stars under sponsorship of RCA with Al Meyer, Leo J. Meyberg Co., chairman of the day.

IES, Southern Calif. Section, Los Angeles, June 3, four papers of the regional conference in San Francisco were reviewed: Frank Van Gilluwe presented H. L. Logan's paper "The engineer looks at retail selling". Lloyd A. Gates presented Chas. T. Bakeman's paper "Objective standards in fluorescent lighting." Alston Rodgers presented a paper prepared by Ward Harrison and himself on "Fluorescent luminaires of today—How will they seem in '45?" Robert Case presented Ray N. Green's paper "Infra-red for drying and insect pest control".

I.E.S., San Francisco Bay Cities Section, "Aviation and Seadrome lighting". Speaker Fred Wellhouse, Westinghouse Electric & Mfg. Co., San Francisco. July 1.

Electrical Estimators Club, Los Angeles, May 22, Herbert Mann presented "Importance of properly planned homes to the electrical industry."

Electrical Maintenance Engineers' Assn. of Northern Calif., June 26 meeting, "Blackout and defense lighting" by W. A. Cyr, ELECTRICAL WEST. Newly elected President W. C. James, presiding.

Air Conditioning Society of San Francisco held its first program of the new fiscal year June 26, Bellview Hotel. Newly elected president I. C. "Ike" Bell of Drayer Hanson Co. presided. New vice president is Jess E. Rauch, California Refrigerator Co. and James R. Hedge, Pacific Gas and Electric Co., secretary. Board of directors in addition to the officers includes O. W. Johnson and R. B. Holland. Program committee chairman is W. W. Cockins, chairman of membership and attendance committee is R. C. Cushing, publicity committee chairman Harry Spaulding.

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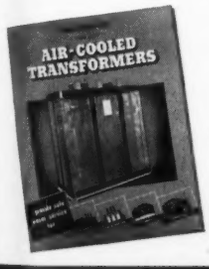
BECAUSE IT'S AIR-COOLED

No liquids! Nothing to explode! Nothing to catch fire! Nothing to give off toxic gases! The ASL Air-cooled Transformer is absolutely safe for any indoor location. It can be placed any place indoors near the load to shorten secondary cable runs—with perfect safety to men working within a few feet of it!

NO VAULT IS REQUIRED to meet National Electric Code requirements. On one recent installation $500 was saved by not building a vault.

EASY TO INSTALL. Ideal for quick plant expansion—no time out for vaults! Just set it up and connect it!

NO LIQUID RECONDITIONING worries—nothing to recondition! Maintenance costs are low as only an infrequent inspection is necessary.



RATINGS: 150 to 2000 kv-a, three phase; 150 to 1250 kv-a, single phase, 60 cycles, 13,200 volts.

THE ONLY large capacity completely developed, completely field-tested, air-cooled transformer on the market today. Write for Booklet 2254, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N.

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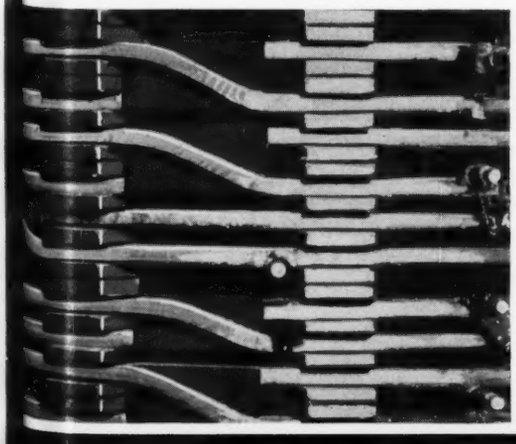
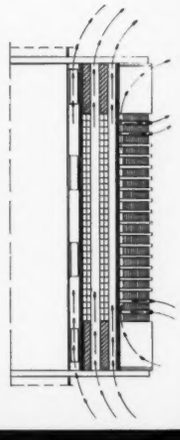
IT'S AIR-COOLED! Windings are spaced to permit the natural circulation of air. Air enters at bottom of vertical ducts, and between the layers of coils.





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RATINGS: 60 cycle, 13200-volt class and below, 150 to 1250 kv-a single phase, 150 to 2000 kv-a, three phase. Small air-cooled transformers for indoor service from 1 to 100 kv-a, 2400-volt class and below.

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And R.I.P. Porcelain is the Easy, Permanent Way to Eliminate All Insulator-Generated Noise

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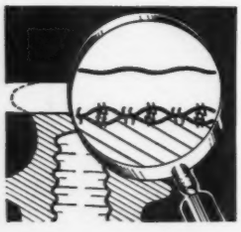
Westinghouse supplies a complete line of low voltage pin type insulators, designs of time-proved efficiency for every application. R.I.P. treatment is optional and, we believe, necessary. Two factories—Derry, Pa., and Emeryville, Calif. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

R.I.P. is Simple, Permanent, Foolproof...NOT A GADGET



BEFORE R.I.P. Capacity currents jump across the tiny air gaps that exist between conductors and insulator surfaces. These capacity arcs are miniature radio stations. Their signals are picked up at every point on the dial. Result — radio interference.

AFTER R.I.P. Note what happens when the R.I.P. glaze is applied to the insulator surface. Capacity currents flow through contact points, *but not across air gaps.* No arcs . . . no radio interference.

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Westinghouse pin type insulators will easily pass ten or more cycles in this thermocyclic test, consisting of alternate submersions in boiling hot and icy cold water. Here's a grueling test that makes service "out on the line" look sissy. Will your present insulators pass such a test without breaking?

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W WESTINGHOUSE ELECTRIC

NEWS of the industry

FPC FINDS WESTERN POWER SUPPLY ADEQUATE

Whether power facilities of the Far West are capable of meeting both normal and present and anticipated defense loads was studied at a series of conferences in San Francisco, Portland and Denver conducted by Leland Olds, president of FPC with members of his staff. Held behind closed doors with utility executives, Army and Navy representatives and FPC people in attendance the conferences canvassed the whole power situation.

Off the record reports of the outcome of the sessions were reassuring as regards the Western power outlook. After discussing present peak kilowatt demands and energy loads on each system; the approximate increment in present loads caused by defense activities and probable future defense loads; total loads anticipated, both assured and prospective for the next three years; present and future power supply; new interconnections proposed and possible emergency measures should occasion necessitate, each conference adjourned without formal action or recommendations.

At the San Francisco session emphasis was placed upon the degree to which Western systems have cooperated in the past, irrespective of contracts or whether privately owned or municipal. Every emergency had been met and any system in trouble was certain of outside help. It was pointed out that there was no reason for any future change in this attitude.

Preceding this meeting Chairman Olds had expressed an opinion that the controversial Antioch steam plant of the Central Valleys project was needed both for firming up Shasta Dam power and as a defense measure. Appropriations for this have been eliminated from USBR funds in both House and Senate.

In Portland, Olds talked about a "critical power shortage" in the Northwest. No explanation was made that any such shortage was purely temporary—due to a serious deficiency in rain and snowfall and to Bonneville's oversold position. Nor was serious consideration given to the desirability of interconnecting all private and governmental systems in the Northwest for the purpose of power interchange. However, Oregon Utilities Commissioner Ormand Bean declared after the hearing that "the key to a successfully worked out plan of cooperation between public and private utilities is the necessary interconnection and interchange of power."

At Denver requirements for the area included in Colorado, Wyoming, New Mexico, North and South Dakota, Oklahoma, Texas, Nebraska, Kansas and Missouri were considered. Thomas R. Tate, FPC chief engineer, estimated that 108,000 kw. more than present capacities would be required by 1942 and probably another 133,000 kw. a year later. No specific defense projects were indicated for the region, but emphasis was placed on the fact that geographical location provided natural defense barriers against possible attack that were highly desirable. Tate contended that steps should be taken immediately to increase power supplies for the region (over and above existing capacities) by possibly 500,000 kw.

Utility men present at the conference asserted that the 108,000 and 133,000 kw. increases in capacity could easily be furnished provided a market was in sight, but they were somewhat baffled by the 500,000 kw. potential additional demand, particularly since there were no pledges to purchase power supplies in any such volume.

PORTLAND UTILITY SETS NEW "SURCHARGE" RATES

Portland General Electric Co. has adopted a "locality surcharge" rate policy in line with rate schedules of PUDs and municipalities distributing Bonneville power. Under PGE's locality surcharge rate policy, each community will be given incentive to earn lower rates by increasing its use of electricity, thus helping to lower operation costs—since rates will vary in territorial divisions according to actual costs of doing business in each area. According to the company, the need for the new policy was seen in the summer of 1940, and F. O. McMillan, head of electrical engineering, Oregon State College, was retained to direct necessary studies. These studies are partially complete, and new rates are being placed in effect in studied sections. Salem, Ore., one of the communities re-rated, has a charge based on present Bonneville standard "objective schedules" plus a locality surcharge of 5%. According to PGE, this surcharge falls far short of meeting taxes imposed by federal, state, county and city governments. The federal energy tax alone amounts to 3⅓%.

For many years, PGE pioneered the theory of "postage stamp" rates.

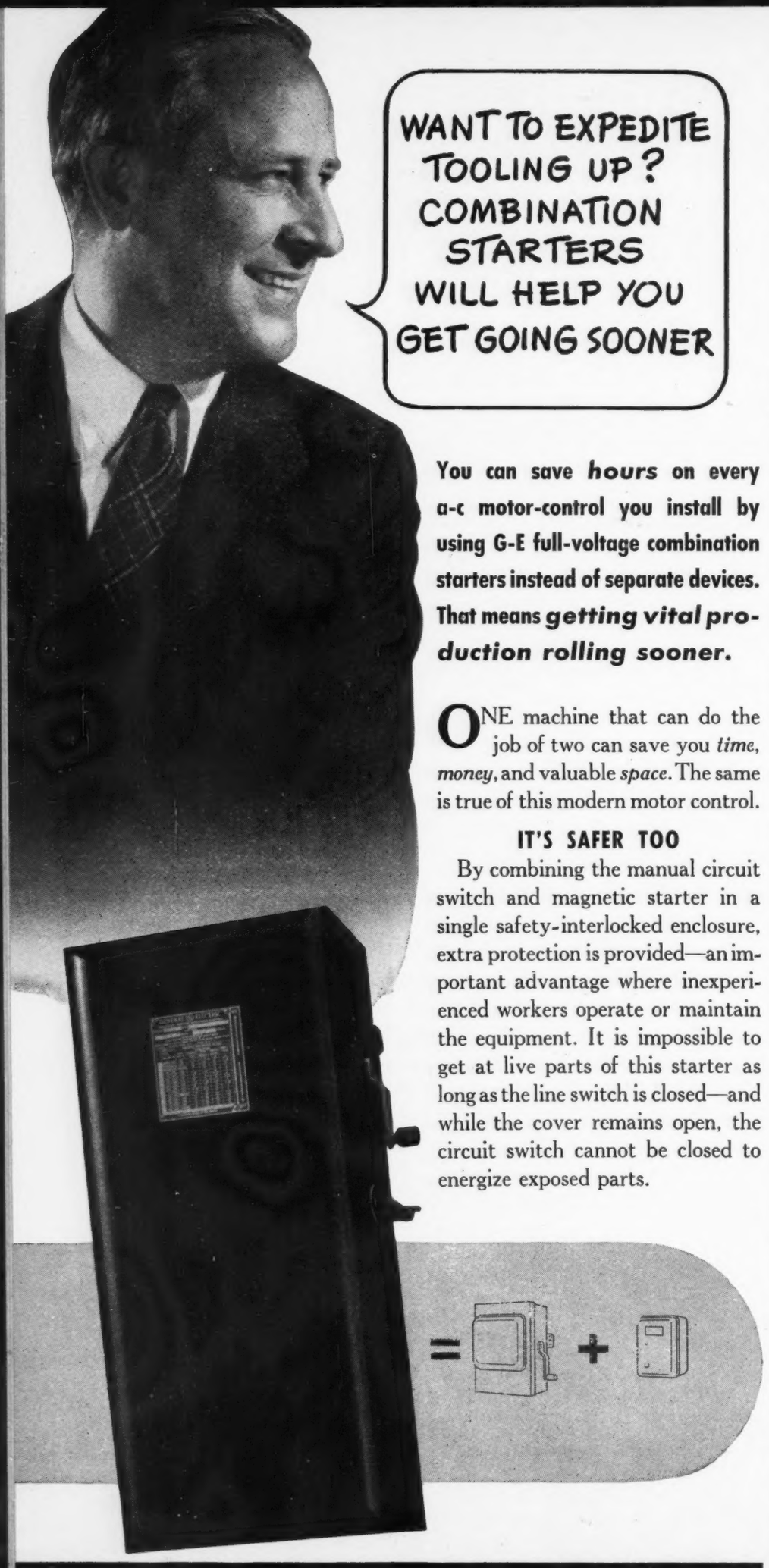
NINTH HETCHY HETCHY ELECTION IN NOVEMBER

San Francisco's Public Utilities Commission has begun preparation of a public ownership plan to be placed before voters in the November election to effect compliance with Secretary Ickes' court victory on disposal of by-product power from the Hetch Hetchy water supply system. Present idea is to submit a revenue bond proposal ranging between $65,000,000 and $70,000,000 for purchase of the Pacific Gas and Electric Co. distribution facilities within the city limits, construction of a transmission line from Newark substation to San Francisco and erection of a 20,000-kw. power house at Red Mountain Bar on the Hetch Hetchy aqueduct. Similar proposals have been defeated eight times in past elections.

Several alternative plans have been submitted to city officials by civic organizations but have been rejected. One was that an immediate attempt be made to get Congressional amendment of the Raker Act (the grant under which Hetch Hetchy was turned over to the city) to permit sale of power. Another was that the municipal power plan be confined to a $20,000,000 proposition, just sufficient to distribute the present Hetch Hetchy output. The third was that an attempt be made to sell the power to the Central Valley project at the same rate now paid by PG and E.

Secretary Ickes has made nine stipulations to which the city must conform to secure his support for a stay of execution of court judgment that would deny the city present power sales revenues. Among them are that no other bond issues will be submitted in the same election; that Secretary Ickes must have an opportunity of approving the plan before it goes on the ballot; that no attempt be made to amend the Raker Act and that city officials will "actively and in good faith" support the proposition.

● ALLOCATION of $130,000 to construct facilities to bring Bonneville power to the United States naval air station and coast guard base at Tongue Point, Ore., was approved June 6 by Paul J. Raver, Bonneville administrator. The funds will provide for land acquisition, surveys, design, clearing and construction of a 6-mi. pole transmission line and a half-mile underground cable, as well as installation of transformers and metering equipment at the Astoria, Ore., substation and substations at the air base. Power will be transmitted at 22,000 volts from the Astoria substation.



You can save *hours* on every a-c motor-control you install by using G-E full-voltage combination starters instead of separate devices. That means *getting vital production rolling sooner.*

ONE machine that can do the job of two can save you *time*, *money*, and valuable *space*. The same is true of this modern motor control.

IT'S SAFER TOO

By combining the manual circuit switch and magnetic starter in a single safety-interlocked enclosure, extra protection is provided—an important advantage where inexperienced workers operate or maintain the equipment. It is impossible to get at live parts of this starter as long as the line switch is closed—and while the cover remains open, the circuit switch cannot be closed to energize exposed parts.

GENERAL ELECTRIC

WESTERN STEEL EXPANSION SLATED FOR $100,000,000

Industrial electrical requirements for both equipment and energy in the far West received a boost late in June when OPM announced from Washington proposed steel-making and steel-finishing facilities for this region costing in excess of $100,000,000. Ingot capacity would be increased 1,556,000 tons.

Columbia Steel (US Steel subsidiary) proposed a $63,200,000 expansion program that included additional coke ovens, blast furnace, open hearth plant, bloom and slab mill, jobbing and sheet mills, plate mills and a steel foundry at its Ironton plant at Provo, Utah. It also would install an additional open hearth furnace and rolling mills at Torrence, and open hearth furnaces, blooming mill, billet mill and merchant mill at its Pittsburg, Calif. plants.

Bethlehem Steel would expend $12,000,000 on additional open hearth furnaces, electric furnace soaking pits, blooming, billet, combination bar and structural mills at Los Angeles; additional open hearth and reheating furnaces at South San Francisco and similar facilities at Seattle.

Heavy forging facilities are proposed at Isaacson Iron Works, Seattle; American Forge Co., Oakland; Moore Drydock Co., Oakland and National Supply Co., Los Angeles.

Pacific States Steel Co. at Niles, Calif., will increase its facilities for alloy ingots for heavy forgings. Pacific Car and Foundry at Seattle proposed a new steel foundry and Colorado Fuel and Iron at Pueblo submitted a proposal for a $15,000,000, 250,000-ton increase in facilities.

Interest in the Far West also centered in announcements that additional aluminum and magnesium reduction facilities would be located adjacent to Bonneville and Grand Coulee Dams in the Northwest and near Boulder Dam.

● APPLICATION for the purchase of the facilities of the Butte Light & Power Co. of Scotts Mills, Ore., has been filed with the FPC by the Portland General Electric Co. The Butte company serves 200 customers in Marion and Clackamas counties and owns a 115-kva. hydroelectric generating plant.

● HEARINGS on 29 proposed rural electric extensions in the Grays Harbor area were heard recently by the PUD Commissioners at Aberdeen. The estimated cost of the work was placed at $136,00. They will require two years to complete if authorized, it was stated. The extensions are proposed in scattered sections of Grays Harbor county.

PG AND E GETS FEATHER RIVER PLANT LICENSES

Denied, issued, rescinded and now re-issued, a license for the construction of the 80,000-kw. Cresta and 68,000-kw. Pulga plants on the Feather River has been received by Pacific Gas and Electric Co. from the Federal Power Commission. However, the order and opinion granting the license are hedged with several stringent provisions. Also they state that "assurance against shortage of power for California's share of the defense program will require not only the expeditious construction of the Cresta and Pulga plants, but also the earliest possible completion of the Central Valley Project including the proposed steam plant at Antioch."

Among the provisions of the order were the following:

"As a special condition to the issuance of this license, the licensee expressly agrees that, until otherwise directed by the commission, it will not, without first obtaining permission of the commission:

(a) Construct additional generating capacity;

(b) Increase any existing generating capacity;

(c) Acquire any additional generating capacity by lease purchase, or otherwise;

(d) Enter into any contract for additional generating capacity; or

(e) Exercise any option under, or otherwise extend, any contract existing at the time of service of this order to the licensee; if such construction, increase, acquisition, contract, option or extension will make available to it more than 5,000 kw. of additional generating capacity at one plant or from any one source or will make available to it 20,000 kw. of additional generating capacity from any number of plants or from any number of sources; and that any violation of the provisions of this paragraph shall constitute grounds for the revocation of the license."

Also the order would incorporate all features of the company's Feather River developments including an already existing plant at Big Bend covered in a minor license, into this new major project license with a term of but 35 years instead of the usual 50 years. At the request of the California Fish and Game Commission, the license would reserve to the FPC the right to regulate stream flow for the protection of fish life.

PG and E originally applied for the license in late 1940. This application was dismissed on Nov. 5 on the grounds that there had been an insufficient showing as to the needs for additional gen-

Combination starters are taken out and re-installed more quickly than separate devices. That's why they multiply savings on changeover.

AUTOMOTIVE manufacturers have long recognized that the right control for them is the control that has everything in one "package." That's because, with mass-production methods, they periodically change over their equipment to re-adapt it to changing demands. It's especially during this changeover period that savings are made—you make the original installation savings all over again each time the motor, or control, or machine is relocated.

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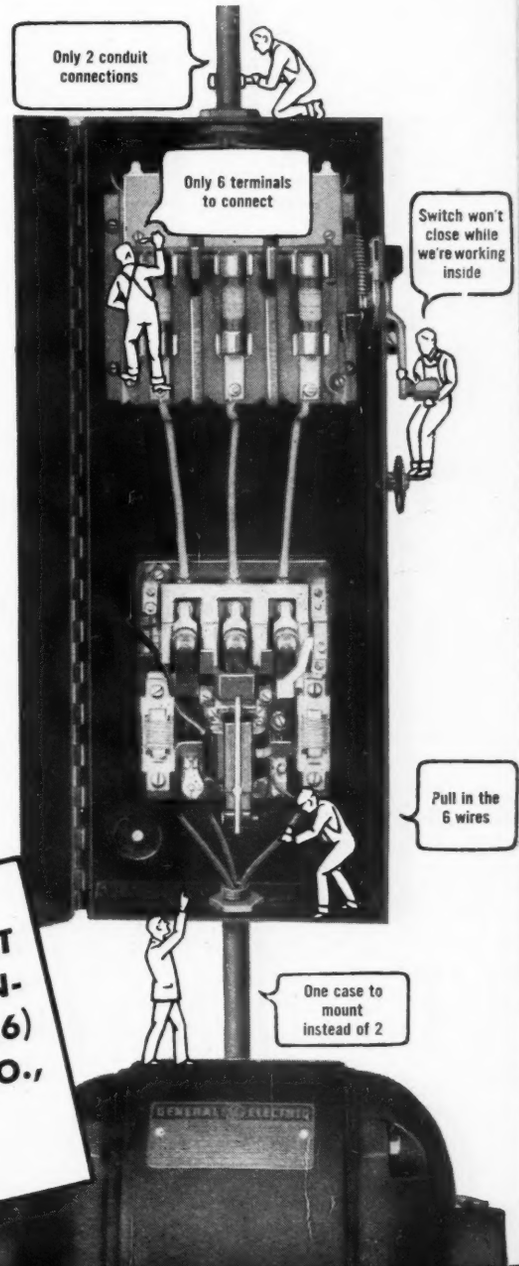
Only 2 conduit connections
Only 6 terminals to connect
Switch won't close while we're working inside
Pull in the 6 wires
One case to mount instead of 2

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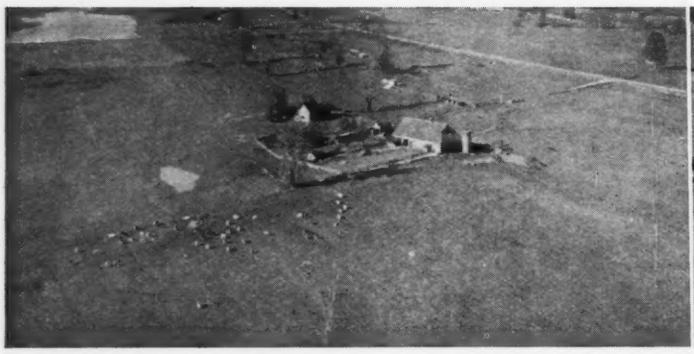
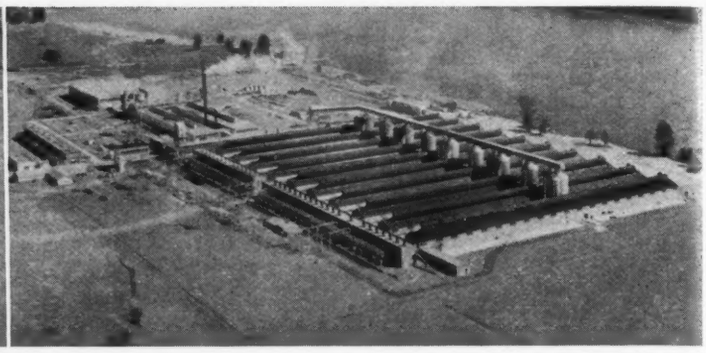




On March 9, 1940, cows grazed peacefully in this pasture on the Washington shore of the Columbia River. Fifteen months later the imposing 150,000,000-lb.-per-year aluminum plant of the Aluminum Company of America had been completed on the site. The Alcoa installation, a 5-unit job, utilizes 165,000 kw. of Bonneville power. Output is greater than U. S. total in last World War but will be only one-fifth of the nation's planned production a year from now.

erating capacity. In December informal conferences were held at which data on load growth were presented indicating that the plants would be required to meet power demands prior to the completion of the Shasta Dam plant. On Feb. 19, 1941, an order was issued granting the license. Subsequently PG and E sought a modification of the order and shortly thereafter the FPC rescinded the license on the grounds that "the actions of the applicant had not been marked by candor or frankness."

Raver Re-States Bonneville Public Power Policies

That private utilities of the Pacific Northwest may expect little cooperation from federal projects in that region was the inference gained from a speech by Bonneville Administrator Paul J. Raver before the Washington State Public Utility District Commissioners' annual meeting at Grand Coulee June 8.

"Congress made the Columbia river development a public power program," Raver declared, "and it will continue to be a public power program. The requirements of national defense may make it necessary for us to make emergency connections with private utility companies in a few instances where required for continuity of service to national defense industries. Primarily, however, our policy will be to make connections for the interchange of power only with public agencies such as the City Light of Seattle, the City Light of Tacoma, the city of Centralia and the cities of McMinnville and Eugene, the public utility district of Grays Harbor and others.

"The power program is also a regional program. The fundamental idea of the federal system is to give all communities an equal opportunity to participate by providing them with power at the same standard low price.

"The Columbia river development is also a non-profit program, and to implement this, the government is providing power not only at a price which excludes any profit, but at a price which represents a subsidy—a subsidy in time, a subsidy under which the repayment of the capital embarked in the enterprise is extended over a period of time much longer than ordinarily required of private capital."

Raver declared that the government regards public ownership as a "means to an end, and not the end." He said that since the end to be accomplished is "low-cost electricity distributed with the profit to the ultimate consumer over the entire region, public ownership must be accomplished at the lowest possible cost." He described the government program as one in which the government participates in the acquisition of private utility company properties and eliminates all the unnecessary fees and charges of private fiscal agents and private negotiators, which "tend to increase the cost of private property acquisition and defeat the goal of low-cost electricity."

Raver also emphasized that if public ownership is to be a successful and justifiable alternative to private ownership, the ultimate consumer must receive electricity at a price lower than under private ownership.,

"This means that the resale rates under which low-cost Bonneville-Grand Coulee power is distributed to the ultimate consumer must be rates which cover only the actual cost of such distribution. There is no place in this program for the utilization of electric rates as a collection device for building city halls, swimming pools or other public developments however laudable they may be. The taxpayers of the United States did not lend this money to the people of the Northwest for the purpose of building such local public works. They have provided it to assist in the development of the national resources of the region for the general public welfare. The repayment of this loan depends upon maximum development of these resources in the shortest period of time. This can only be accomplished by establishing the lowest possible resale rates to the ultimate consumer."

USBR Calls Bids for Keswick Project on Sacramento River

Immediate construction of Keswick dam and power house on the Sacramento River below Shasta Dam, assertedly for power purposes, has been announced by the Reclamation Bureau's Sacramento office. Bids have been called for July 14.

Keswick will have an installed capacity of 75,000 kw., one-fifth that of Shasta. The dam will be located at Rock Creek, near Redding. It will be 80 ft. high and 600 ft. long. It will contain 100,000 cu. yd. of concrete and will involve 396,000 cu. yd. of excavation. No estimate of the cost is given. Primary purpose of the project as planned originally was for stream flow control of water released from Shasta Dam for power generation.

Utah Town Schedules Bond Election for New Plant

Citizens of Murray, Utah, will shortly vote on a $200,000 revenue bond issue to build a new 2,000-kw. generating power plant.

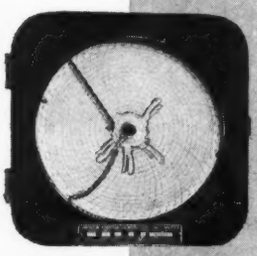
Rapid growth of the city is responsible for the action, say city officials. Present capacity is barely adequate to supply demand and an immediate shortage is imminent.

Present output of the three diesels and the hydro plant is 1,400 kw. The proposed new plant would generate 2,000 kw. and provide an ample supply of power for the city's needs, plus a margin safe for ten years. Following the bond issue it would take approximately 11 months for complete installation, state city commissioners.

LOAD CONDITIONS ON STATION AND FEEDER EQUIPMENT..

. . . visible at a glance with

LINCOLN AMPERE DEMAND METERS



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These meters operate like an ordinary indicating ammeter except that their response to load is highly time lagged. Their response to load follows the typical heating curve of distribution equipment, the indications depending upon the heating effect of the load. With their rugged construction and highly damped action, Lincoln Meters have no equal in low maintenance.

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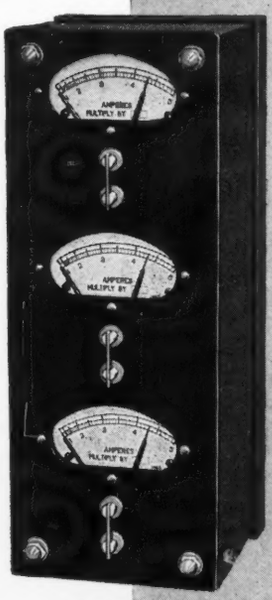
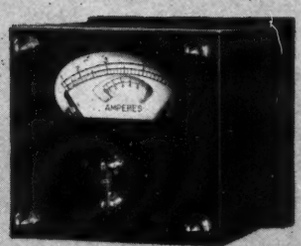
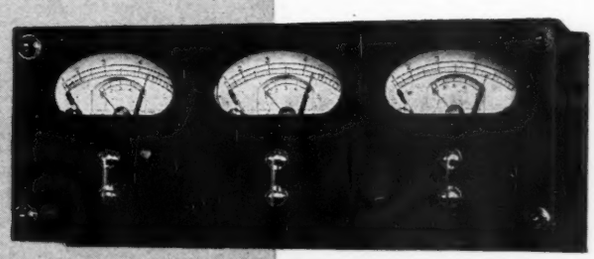


TYPE 3-ADV, TRIPLEX STYLE



TYPE ADW, SQUARE STYLE



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Complete Installations at Bonneville and Coulee Urged

Bonneville's engineering consulting board has reported to Administrator Paul J. Raver that preliminary studies of the Pacific Northwest power problem indicated a need for immediate installation of full complements of generators at both Bonneville and Grand Coulee dams on the Columbia river. They pointed out that investigation had disclosed the Pacific Northwest the principal area in the United States today where power could be made available quickly and economically for purposes of furthering the national defense program.

"Here in the Northwest the dams have already been built and all that is required to bring their tremendous capacities for power generation into full play is the installation of generators," Charles Carey, chief consulting engineer, said. "Elsewhere in the United States, much additional time would be required to construct the dams."

The board informed the administrator that they were confident that all of the power capacities of the two dams—518,400 kw. at Bonneville, 194,400 kw. of which is installed, and 108,000 kw. of which is now under installation; and 1,900,000 kw. at Grand Coulee dam, of which more than 300,000 kw. is now under installation—would be taken up by industries as quickly as it is developed.

Members of the consulting staff include Charles E. Carey, chief consulting engineer and assistant chief of the division of market development and system planning for the administration; Samuel B. Morris, dean of the school of engineering at Stanford University and water consultant for the national resources planning board; E. A. Loew, dean of the college of engineering of the University of Washington; Eugene C. Starr, professor of electrical engineering at Oregon State College; and Dr. Joseph S. Carroll, professor of electrical engineering at Stanford University and director of the Ryan High Voltage Laboratory.

● U. S. CIVIL SERVICE examinations are open to applicants in the following fields: Electrical construction inspection coordinator, $3800 yr.; principal engineer, $5600; senior engineer, $4600; engineer, $3800; associate engineer, $3200; assistant engineer, $2600; junior engineer, $2000. Also included are examination opportunities for senior shipyard inspector (electrical), $3500; shipyard inspector, $3200; associate, $2900; assistant, $2600.

PG and E to Seek More Customer-Owners of Stock

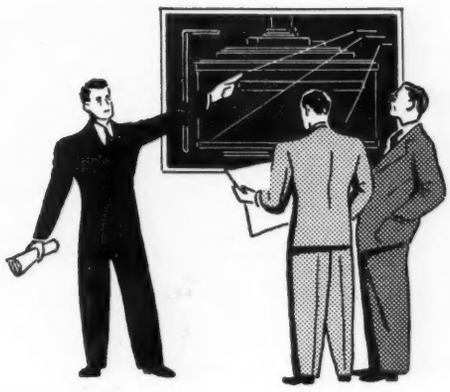
Reverting to former successful over-the-counter employee and customer ownership financing technique, Pacific Gas and Electric Co. plans to sell 400,000 shares of its $25 par 5% first preferred stock. There are 800,000 shares of such stock authorized but unissued, presently outstanding preferred being 5½ and 6% issues. The $10,000,000 to be realized from the sale will be used to reimburse the treasury for capital expenditures.

No announcement has been made as to offering price of the new issue but based upon present yields of the 5½ and 6% preferred, an anticipated price of $26 to $27 per share is indicated. It is planned to sell 320,000 shares to the public and to reserve a certain amount to be sold to employees at a price not less than par. Last such offering by PG and E was in 1932 when 200,000 shares of 6% preferred were sold to approximately 7,000 purchasers in six weeks. Preferred stock is now in the hands of about 59,000 stockholders of whom 48,000 are residents of California. Common shares are held by 67,000 stockholders of whom 21.000 are California residents.

1941 Power Installations Double 1940 Increase

Additional generating capacity totaling 3,352,639 kw. will be installed in the United States during 1941, according to a Federal Power Commission report releasing preliminary results of a survey of the electric utility industry. This compares with 1,877,844 kw. which were reported last year as scheduled for installation during 1940 or an increase of 78.5%. Mountain figures on this survey are 293,117 kw. for 1941 as against 29,055 for 1940, an increase of 908.8%. For the Pacific Coast the figures are 631,062 kw. for 1941 against 138,000 for 1940 or an increase of 357.3%. Other information obtained from the survey indicates that budgeted expenditures for all electric construction for 1941 will amount to $868,209 or approximately $274,000.329 more than the budgeted expenditures for 1940.

● Former Employees of either Los Angeles Gas & Electric Co. or Southern California Edison Co., retained by the Los Angeles Bureau of Power & Light after taking over properties on which they worked, were blanketed into the Civil Service to protect their positions by the voting of Proposition No. 18 at the recent Los Angeles city election.



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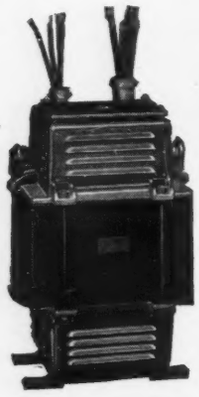

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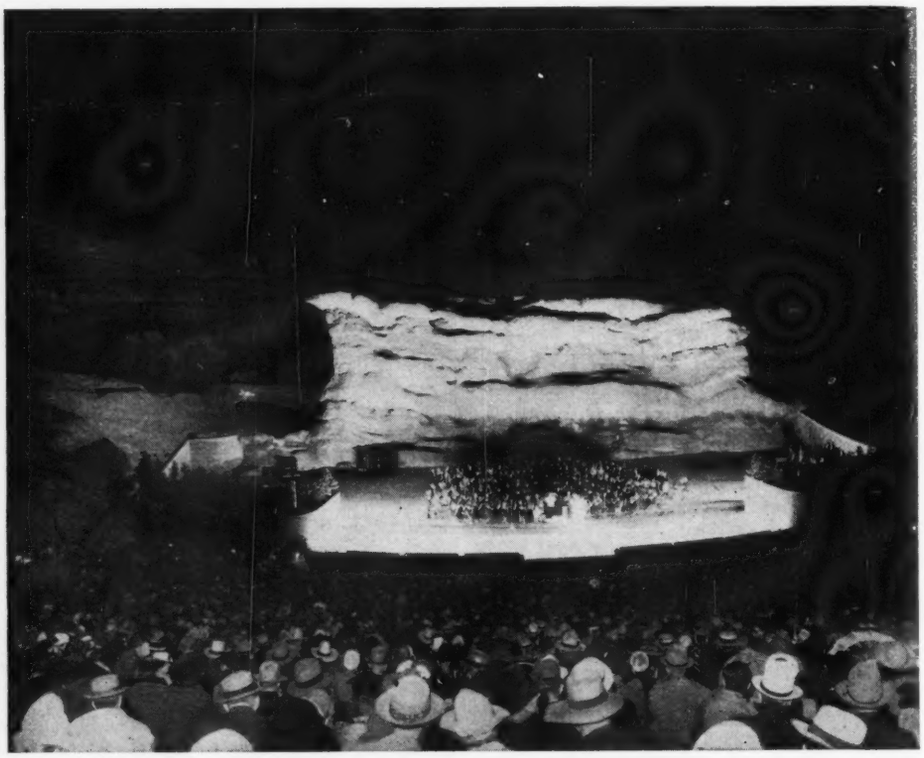


Denver's new outdoor mountain auditorium has a modern 300-kw. lighting installation

Denver Dedicates New Outdoor Mountain Theater

Unheralded by the electrical industry, unsung by the press in advance publicity, one of the nation's most impressive theatrical lighting installations —twice the capacity of Hollywood's famous Bowl—was dedicated June 15, when Denver's Red Rocks mountain park Outdoor Theater was officially opened to the public.

"The public" was personified by 10,000 Rotarians International, assembled in Denver for their thirty-second annual convention. All of them were invited as guests of Denver to participate at ceremonies in a natural setting.

Total connected load to service the mammoth theater is some 300 kilowatts. Service is supplied by a 13,000 kv. line through an underground system. All lights are remote-controlled from a panel in the secluded control room. Dana W. Rowten, Public Service Company of Colorado illuminating engineer, planned and supervised all construction phases. He had the cooperation of George W. Cranmer, Denver's manager of parks and improvements, who conceived the theater plan.

The stage is 68 feet deep and 25 feet long, approached by stone ramps so constructed that trucks, or a herd of large animals, can be driven across them. Tiers of seats to accommodate 10,000 persons, have been chiselled out of solid rock. The audience can see actors on the stage and the lights of Denver, 15 miles in the background, simultaneously.

Rowten started on his electrical assignment at Red Rocks in 1937; covered 6,225 miles by automobile, traveling from his office in Denver to the sandstone "workshop" where his achievement won acclaim June 15.

Air Conditioning Show Attracts Record Exhibits

Focal point of the concurrent Heating, Piping and Air Conditioning Contractors' National Association convention and the American Society of Heating and Ventilating Engineers conclave, was the Pacific Heating and Air Conditioning Exposition, held June 16-20 at the Civic Auditorium, San Francisco. Of prime interest to members of both groups were exhibits by manufacturers such as American Air Filter Co., Brown Instrument Co., Carrier Corp., Chicago Pump Co., Edison Instrument Division, General Controls, Independent Pneumatic Tool Co., Mercoid Corp., Minneapolis-Honeywell Regulator Co., Montgomery Bros., Pacific Gas and Electric Co., Penn Electric Switch Co., Trade-Wind Motor fans, Utility Fan Corp., Webster Electric Corp., Western Blower Co., Westinghouse Electric & Mfg. Co. and White-Rodgers Electric Co. The exhibit took up the entire main floor of the Auditorium with full size equipment being demonstrated by many companies.

New Arizona Steam Plant Sets Record for Country

The first of three 12,500-hp. steam turbo-generators to be installed in the Tempe (Ariz.) plant of the Salt River Valley Water Users' Assn. turned over late last month, with two additional machines scheduled for operation before the end of August. The plant was authorized last fall as part of a program to relieve the desperate water shortage in Arizona that since has been alleviated by record rainfall.

Installation of the steam-driven machines reputedly makes this station the first in the U.S. to contain all three types of prime mover—hydro turbine, Diesel engine and steam turbine. The station already contains 7,100 hp. in impulse wheels which derive their power from a fall in the Cross-cut canal of the association. Also two Diesels generate 14,000 hp.

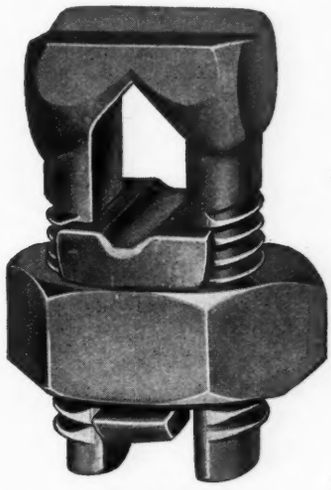
Other distinctive records possessed by the plant include the generation, transformation and delivery of both 60- and 25-cycle power; the fact that a frequency changer is located in the station and also that high voltage energy is received over the transmission network and is stepped down and passed through the frequency changer.

Unique features of the steam installation include outdoor boilers, and the use of pumped well water in the cooling towers. This water is passed through a small hydro-electric unit into the canal and 60% of the energy required originally for pumping is reclaimed.

● Uniform Electrical Code, revised and issued as the 1941 edition, has been republished by the Pacific Coast Electrical Bureau and is now available. The 1940 edition, National Electrical Code, is adopted by reference, selecting a few clarifying clauses in respect to class of occupancy and demand factors, etc. Largely it is an enabling ordinace setting up the inspection department, chief inspector and his duties, a permit and fee system, and accepting the National Electrical Code, the California State Safety orders and the standards of the Underwriters' Laboratories as *prima facie* evidence of conformity with the approved standards of safety to life and property.

● Blachly-Lane County Coop. Electric Assn., Ore., has been given $33,000 to build 16 mi. of new line and re-phase 25 mi. of existing line, serving 13 new members and one airport. The borrower previously has been allotted $120,000 to build 98 mi. of line to serve 446 members, and $19,000 for construction of a generating plant.

COPPER TO COPPER
PREVENTS METALLIC FIGHTS



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"V" groove, clamping jaw of cold forged, pure copper. Flanged sides give greater bearing surface on nut, hence greater strength and no distortion of clamping jaw.

97% copper content, hard metal nut—strong as steel. Full thread engagement with bolt.

Broad, strong head, with size plainly marked. Sides of head have flat surface so wrench or pliers can grip tightly.

85% plus, full thread, die stamped, insures full engagement in nut, hence high strength connectors.

"V" shaped groove, holds wires in three point contact and prevents rocking or looseness.

Made in 12 sizes—6 of forged copper and 6 of machined high strength, high copper content alloy —for No. 10 to 1,000,000 CM conductors.

Send for bulletin and free samples and convince yourself of their superiority.

66-NU X22-NU
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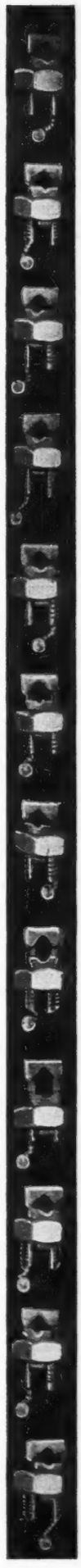

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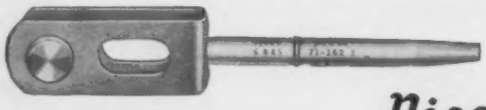

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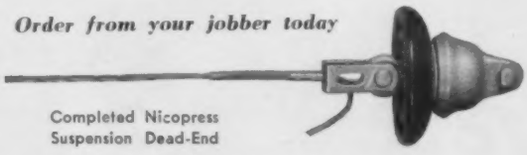
NICOPRESS TOOL No. 51-PJ

SUSPENSION DEAD ENDS

They've got what it takes to stand up and deliver long trouble-free service:—ease and speed of installation—strength—security—long life and low costs.

Nicopress Suspension Dead-Ends permit the conductors to go straight through without bending or distortion, thus assuring a strength that exceeds the rated breaking strength of the conductors and make them "bears" for taking vibration punishment. No special tool is needed as work is done with same tool used in making Nicopress line splices.

Order from your jobber today



Completed Nicopress Suspension Dead-End

THE NATIONAL TELEPHONE SUPPLY CO.

Canadian Mfr.—N. Slater Co., Ltd., Hamilton, Ont.
Export Distributor—International Standard Electric Corp., New York, N. Y.
5100 SUPERIOR AVENUE CLEVELAND, OHIO

WWP Establishes Local Pay Station in Spokane

To give greater convenience to customers, the Washington Water Power company has opened pay stations over the city in Spokane, Washington, June 16, according to an announcement by Lewis A. Lewis, assistant general manager. The company's customers have paid all statements at the general company office in the business district, but with the growing problem of inadequate traffic facilities, customers have found it inconvenient to pay bills downtown.

The company has set up tentatively five pay stations located in various business establishments in the outlying districts to facilitate bill payment. In addition, the company is soon to open a branch office in Hillyard, a Spokane suburb, where all types of business contacts with the utility can be transacted. Pay stations will accept only full payment for bills, for which the customer must present his statement.

Identification of stations will be effected through large enamel signs, signifying that bills can be paid at the location. Customer attention was called to the stations through publicity news items in Spokane newspapers and display advertisements, explaining the service and listing pay stations.

New Mexico City Has New Model Highway Lighting

Dedication of "the world's best lighted mile of highway" at Raton, New Mexico, June 13, was attended by state, municipal and utility executives from Colorado and New Mexico. Governors of both states, highway department heads and engineers, mayors and city electrical inspectors were among the guests summoned by special invitation.

The ceremonial event and lighting achievement were a result of joint efforts by the City of Raton, the Raton Public Service Co., a municipal system, and Rocky Mountain Electrical League whose enginering and promotional talents were contributed. The "pathway of light," at the southern base of Raton Pass, marks a section of the old Santa Fe Trail where, three-quarters of a century ago, camp fires and torches of Indians and pioneer Whites provided the only artificial illumination.

Ultra-modern mercury vapor units, shaded, and mounted on 25-foot standards, are spaced at 60-foot intervals. Each lamp provides 24,000 lumens pendant on a bracket.

To further emphasize the contrast between pioneer and twentieth century lighting equipment, exhibits featured ancient and modern electric irons, lamps, washing machines and fixtures.

TRADE notes

Weston Names Sievers

Weston Electrical Instrument Corp. has announced the appointment of Edward S. Sievers to succeed A. A. Barbera as the Los Angeles representative of the company. Sievers, who has been associated with the Weston Company for many years, has been identified with its southern California territory since 1937. John D. Farneman is associate to Mr. Sievers in southern California.

● WALTHAM, DEWITT AND KRUSI, San Francisco, have been appointed representatives of the Corning Glass Works for the sale of insulators in southern Oregon, northern California and western Nevada, according to an announcement by C. J. Phillips, sales manager, Corning insulation division.

● CROSLEY held its divisional distributors' meeting for the eleven western states in San Francisco at the Clift Hotel July 15 to 17. California Electric Supply Co., distributor in the San Francisco Bay region and for northern California, was host to the meeting. Showing of the 1942 radio line was the main object but other important subjects concerning distribution under a defense economy were also brought up. From the factory headquarters at Cincinnati came Raymond C. Cosgrove, vice president and general manager, R. I. Petrie, vice president and general sales manager, L. Martin Krautter, advertising and sales promotion manager, and J. H. Rasmussen, manager of the radio division.

CONTRACTS

SULPHUR SPRINGS VALLEY COOP., INC., Willcox, Ariz., has awarded a contract to the Vancott Co., Los Angeles, for 142.4 mi. of line serving 234 members. Successful bid was $137,404.96.

YAMPA VALLEY ELECTRIC ASSOCIATION, INC., Steamboat Springs, Colo., has awarded a contract to Snyder & Johnson, Inc., for 178.93 mi. of line serving 268 members. Successful bid was $99,080.17.

FALL RIVER RURAL ELECTRIC COOP., INC., Ashton, Idaho, has awarded a contract to National Construction Co., Rapid City, South Dakota, for 62.7 mi. of line serving 97 members, with a successful bid of $39,890.15.

PRAIRIE POWER COOP., INC., Fairfield, Idaho, has awarded a contract to National Construction Co., Rapid City, S.D., for building 119.15 mi. of line serving 150 members. Successful bid was $62,347.98.

MOVED

L/C Electric Co., of Longview, Wash., moved from 1325 Broadway to 1428 Commerce St.

Abbett Electric Co., of which George Abbett, its proprietor, is president of the San Francisco Electrical Contractors Assn., has moved from 259 Clara St. to 472 Tehama St., in quarters formerly occupied by C. A. Langlais Electric Co. The latter has moved to 488 Bryant St., San Francisco.

Standard Electric Construction Co., of San Francisco, has moved from 666 Mission St. to 729 Mina St.

G.C.A.
Lamp Replacers
Lamp Base Removers
Cartridge Fuse Tongs
Switch Hooks
Send for Catalogue
We have been making safety tools for 24 years
THE G. C. A. Manufacturing Co.
Pittsfield, Mass.

SMOOT-HOLMAN COMPANY
Pioneers of Lighting in the West
LUMINAIRES REFLECTORS
SIGHT-CRAFT
FLUORESCENTS FLOODLIGHTS
INDUSTRIAL AND COMMERCIAL LIGHTING EQUIPMENT
HOME OFFICE AND FACTORY . . . INGLEWOOD, CALIFORNIA
WAREHOUSES
SAN FRANCISCO 460—7th St.
HOUSTON, TEXAS 315 Crawford Street
FRED ZAUGG 630 N.W. 10th Ave., Portland, Ore.
COAST SALES CO. 307 Main St., Seattle, Wash.
STEVENS SALES CO. 41 Post Office Place, Salt Lake City, Utah
G. S. SPANGLER 618 Colorado Bldg., Denver, Colo.

MATTHEWS CONNECTORS
For All Kinds of Wire Connections Without Solder

NUTYPE SERVICE CONNECTORS
For copper to copper—in 12 sizes.

With or without Nut Retainers.
Also available in some sizes for aluminum to aluminum and copper to aluminum connections.

SERVICE ENTRANCE CONNECTORS

A sturdy and economical means for connecting house service or other end to end copper connections (not under tension).

UNIVISE TELEPHONE and small copper wire connector.

Vice type—strong and easily connected or disconnected.

PARALLEL CLAMPS

For connecting small tap off wires to larger main conductors at a saving.

Write for Bulletins and Samples
W. N. MATTHEWS CORPORATION
St. Louis, U. S. A.

WHO CARES about GRAIN STRUCTURE?

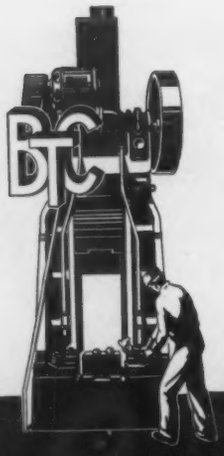
THE pipe above is a standard model by the manufacturer of fine line—not a collector's item. Notice the distinct grain structure in this excellent specimen. Metal too, has a definite grain structure and the steel buyer for your BTC hi-line-hardware knows this subject as the pipe manufacturer knows his briar.

THE BREWER-TITCHENER CORPORATION
Cortland, New York

LITTLE LESSONS IN FORGING

The tough fibrous construction of a forging billet is known as grain structure and is one of the *known* characteristics of a forging. During the forging process this tough grain structure can be controlled. Examine the photomograph of this typical forging. The grain of the metal flows in such a manner as to insure the proper strength where it is most needed. Here again is but one of the reasons why BTC hi-line-hardware is an added margin of safety.

THROUGH YOUR INSULATOR MANUFACTURER ONLY



FORGERS TO THE ELECTRICAL INDUSTRY

PEOPLE

made this news

Al C. Joy Heads National PUAA

Al C. Joy, manager of the publicity and advertising department of the Pacific Gas and Electric Co., was elected president of the Public Utilities Advertising Association of America at the Boston convention of that organization May 26-28. Three years ago he was

JOY

elected third vice-president having previously served several terms on the board of directors. The PUAA is a branch of the advertising Federation of America with a membership consisting of heads of 125 utility advertising departments located in 38 states.

Joy, a native Californian, started to learn the printing trade at an early age and stuck to it until he emerged from Stanford University to become a reporter in the newsrooms of California papers. During his newspaper career he worked on the Fresno *Republican*, *Tribune* and *Herald*. All of these papers are now defunct but Al disclaims any responsibility. Later he was city editor of the Oakland *Examiner* and the Seattle *Star*, dramatic critic of the San Francisco *Examiner* and for many years sports editor of that paper.

At intervals he deserted the typewriter to raise the voice of Joy above the footlights in stock companies that played in Honolulu, in Sacramento and at the Alcazar in San Francisco.

In 1918 Joy entered the field of pub-

TO KEEP THEM

Rolling Out!

In the present national emergency, we all agree DEFENSE COMES FIRST!

An unending avalanche of planes, ships, guns, ammunition, machinery, equipment, supplies must roll out from the production lines at ever-increasing momentum.

Roebling has geared up its electric wire and cable plant to meet the emergency. Day and night the wheels turn at top speed. Every fraction of capacity has been put to work. Electrical wires and cables in endless variety are streaming from the Roebling plant ready for defense duty.

Roebling appreciates the fine cooperation and understanding of valued customers who have experienced unavoidable shortages and shipping delays, caused by the unprecedented production situation.

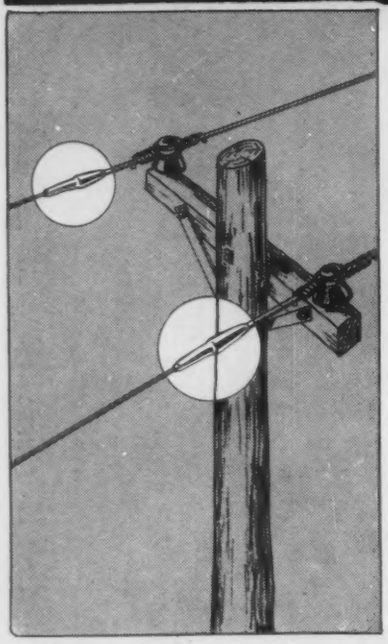
JOHN A. ROEBLING'S SONS COMPANY
OF CALIFORNIA

San Francisco • Seattle • Los Angeles • Portland

ROEBLING 1841 1941 100th ANNIVERSARY

ROEBLING
ELECTRICAL
WIRES AND CABLES

modernize
YOUR
DISTRIBUTION
PRACTICE—



Urban construction where line drops portion of load and smaller wire size will carry current flowing through the rest of circuit.

RELIABLE
STRAIGHTLINE
REDUCERS....

Save money and clean up appearance while eliminating a double dead-end. Sag of larger wire is only increased two or three inches as spans of city distribution are short.

Reliable
ELECTRIC COMPANY
OVER 30 YEARS SERVICE TO THE UTILITIES
3145 CARROLL AVENUE · CHICAGO ILLINOIS

licity in the campaign of Governor William D. Stephens and in 1920 went to New York as national publicity manager of Senator Hiram W. Johnson, who sought the Republican presidential nomination. Immediately thereafter he became publicity manager for the Sun-Maid Raisin Growers Association in Fresno and a year and a half later joined the San Joaquin Light & Power Corp. as advertising and publicity manager. Coincidentally he held a similar position with Great Western Power Co. Since 1930 he has directed PG and E advertising and publicity.

He is a past president of the San Joaquin Valley Baseball League and the California Raisin Festival Association. He also has served as president of the Electric Club, Press Club, Ad Club, and Family Club, all of San Francisco.

● OLIN H. RIRIE, former assistant personnel director, took over the duties as manager of the southern division of the Utah Power & Light Company, June 4. Ririe's headquarters will be at American Fork. He replaces R. E. Bailey, who has been granted a leave of absence because of illness. A native of Ogden, Utah, Mr. Ririe was first employed as a meter reader in 1923. Later he entered the Ogden division accounting department, then served in the commercial and industrial sales department. He was promoted to assistant personnel director in October, 1938.

● CHESTER W. JARRETT, who has held various positions with Portland General Electric Co., Portland, since coming to the company in 1934, has been appointed manager of the company's Vancouver, Wash., division, by Fred G. Hodge, general division manager. He succeeds Laurin E. Hinman who left the company in February on a leave of absence to serve as liaison between the national defense commission and industry.

● MAJOR JOSEPH H. PENGILLY, vice-president of the Los Angeles Electric Club for the past year, has been elected president. Other new officers are: First vice-president, A. D. Brown; second vice-president, C. P. Garman; third vice-president, H. W. Tice; secretary-treasurer, J. A. Long; sergeant-at-arms, S. W. Scarfe; executive committee, W. E. Cranston, Jr., ex-officio; A. J. Bronold, C. M. Fields, A. L. Stone and H. G. McAfferty.

● CHARLES R. HORRELL, well known as a result of his frequent visits to the Pacific Coast, has been elected vice-president and general sales manager of the Sangamo Electric Co. He has been sales manager since 1918.

Edison President Acclaimed by USC

Harry J. Bauer, president of the Southern California Edison Co., has been awarded the University of Southern California Alumni Achievement Trophy, presented annually to the most outstanding Trojan alumnus who by his accomplishments during the preceding year reflects the greatest credit to the university.

An S. C. graduate in law in the class of 1909, Mr. Bauer is prominent in Southern California business, civic and educational circles. He is a member of the university board of trustees, and a trustee of the California Institute of

BAUER

Technology. He is in his twelfth consecutive term as president of the Automobile Club of Southern California, is a member of the California State Bar and the American Bar Association, and a director of a number of leading corporations.

His Edison Co. affiliation antedates his graduation from the university, when he entered the company's legal department. In 1918 he was appointed general counsel, and a year later resigned to enter private business. He returned to the Edison Co. in 1926 as a member of the board of directors, and in 1932 was made chairman of the board. He was named president in 1933.

● EMBREE D. WILSON has taken over the position of general superintendent of the Southern Nevada Power Company at Las Vegas. The company operates power and telephone utilities. Wilson has been associated with the Utah Power & Light Co. for 19 years, and was engineer for the Salt Lake Division of the company when he resigned

KLAUBER

SHERWIN

PECKHAM

San Diego G & E Promotes Three

Three executive promotions have recently been made in the San Diego Gas & Electric Co. L. M. Klauber, former vice-president in charge of operation, becomes vice-president and general manager. H. R. Peckham, former general superintendent succeeds Klauber, and E. D. Sherwin advances from assistant general superintendent to general superintendent.

Klauber is a native San Diegan and a graduate in electrical engineering from Stanford University. Following two years in the Westinghouse apprentice course in East Pittsburgh, he returned to San Diego, where he became a salesman for the local utility company. Subsequently he became engineer of records, superintendent of the electric department, general superintendent and since 1932 vice-president in charge of operation. He is a past president of the Pacific Coast Electrical Association and the Pacific Coast Gas Association. He has two hobbies—statistics and herpetology. The first interest is indicated by membership in the Am. Math. Soc., the Math. Assn. of America, Am. Meteorological Soc. and the Seismological Soc. of America. His interest in reptiles is reflected in his membership in the San Diego Zoological Society (he is curator of reptiles at the San Diego Zoo) and in the Am. Soc. of Icthyologists and Herpetologists.

Peckham started work with the company in 1912 in the record department. During the World War he served as a captain in the 318th Engineers. Following the war he went with the Tacoma (Wash.) Gas Co. as assistant general superintendent. In 1921 he returned to San Diego in a similar capacity. In 1932 he was made general superintendent.

Sherwin's career with the company started before his graduation from Stanford University when he worked summer vacations in the record department. After serving as a lieutenant of engineers in the war, he went with the U. S. Reclamation Bureau, rejoining the San Diego Company in 1920 as a surveyor. His rise was rapid. In 1922 he was made assistant superintendent of electric distribution. Two years later he assumed similar responsibility for electric production and in 1932 became assistant general superintendent.

● LIEUT. C. P. ALTLAND is now affiliated with the 11th Naval District, San Diego. He was formerly with the Southern California Edison Co. purchasing department.

Guy Barker Dies

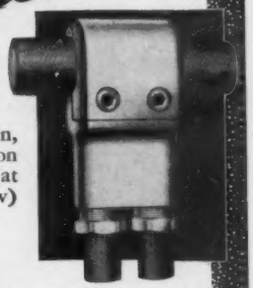
G. A. Barker, manager of Johns-Manville's public utility and electrical products department, died suddenly of a heart attack June 17, in New York City. Mr. Barker, prior to his most recent appointment, April 2, served Johns-Manville Co. since 1921 as Pacific division manager of power products. He was formerly associated with Pacific Gas and Electric Co., held the position of chief engineer of Central Teresa Sugar Co., Cuba, and was at one time chief mechanical engineer of the industrial Accident Commission of Calif. Mr. Barker was a member of Sigma Xi and Tau Beta Pi, honorary engineering fraternities. His career won him wide recognition in Western electrical circles, and his friendship was valued by all his associates.

● C. TOM COYLE, electrical inspector of Fresno, Calif., since 1920, and chief electrical inspector for the past 15 years, died May 29, after an illness of over 9 months. He was a past president of the Southwestern Section, IAEI, and was responsible for the organization of the Central California Chapter, of which he was chairman. He had been an active member of IBEW and various lodges, had served in the 91st Division during the World War and was wounded in action.

The MOST COMPLETE LINE OF Tee Connectors

ALL good types —any size.

With a *hinged clamp* for the main, the Penn-Union Type HFM (at right, and below) is easy to apply.



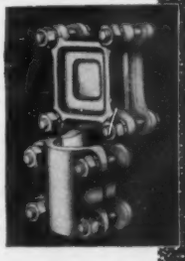
Split sleeve contact unit gives permanent grip on branch.

Made for single or multiple branch connections.

ALSO CABLE TAPS — a complete line of 90° and Parallel taps, for one or more branches,

COMPACT and POSITIVE. The Penn-Union Type SM gives equal tightening on the run and tap. Self-locking, dependable.

CLAMP TYPE TEES for all sizes of tubing and cable—a full line. Machined contact surfaces.



MANY MORE TYPES—for all combinations. For connecting flat bar, run or tap, to tubing or cable. Also "general utility" tees that take a wide range of conductor sizes. You will find that the Penn-Union line has *exactly what you need.*

FOR ANY CONDUCTOR FITTING—Terminals, Service Connectors, Studs, Two-Ways, Ground Clamps—see the THOUSANDS in the Penn-Union Catalog.

Preferred by the largest users, who have found that *Penn-Union on a fitting is the best guarantee of Dependability.*

KENNETH ANDERSON CO.
1855 Industrial Street, Los Angeles
NICHOLAS & COOK
1063 Howard Street, San Francisco
NORTHWESTERN AGENCIES
2411 First Ave., Seattle, Washington
Penn-Union Electric Corp., Erie, Pa.

PENN-UNION
Conductor Fittings

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PROFILES *of the month*

Home Service is in the news these days, especially in the Northwest, where W. A. Huckins, Utah Power & Light sales manager headed the NWEL & P committee. With him, above, are Lucile Ramirez, Washington Water Power; Edith Rauch, Puget Sound P & L; and Dorothy Stewart, Montana Power, formerly of the Utah Power and Light Co. in Salt Lake

Margurette Reinhart, (at right) is in the news too because as home service director of Idaho Power Co., at Boise, she won second prize in the Laura McCall Award for utilities of the nation

A. E. "Doc" Holloway, in the lower right hand corner, sales vice president of San Diego Gas & Electric, was the star of PCEA Panorama's "Who am I?" in the May issue, p. 66, but his picture was squeezed out. Here it is, his latest

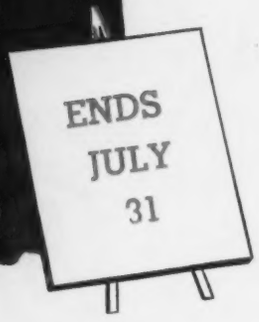
Bill Cranston jr. of Thermador proved to be the Los Angeles Electric Club's most unorthodox president. No stuffed shirt lasted long under his descriptive debunking. His term ended, he will be succeeded by equally unorthodox J. H. Pengilly, of Square D Co., who is seated beside him, pictured just below

Preview of coming campaigns by

P·G·and E·

Final Month

ELECTRIC WATER HEATER CAMPAIGN



On May 20, plans were announced for a company-dealer cooperative Electric Water Heater Campaign offering a $10 discount to buyers and providing dealers with manufacturers' literature and two-color inserts to be supplied by P.G. & E.

The campaign so far has been extremely successful and now enters its final and probably record-breaking month. Dealers who have not come in have no time to lose. See your P.G. & E. office for mailing inserts and details of our 1/3 rebate on newspaper space costs. It's a deal that every real merchandiser will want to play to the limit.

EW 107-741

DEALERS: By watching this page from month to month you can keep informed of sales promotional campaigns to be sponsored by the Pacific Gas and Electric Company and the Electric Appliance Society. Detailed information will be supplied, as usual, through the mail. If such information is not received, call our local office or write Electric Appliance Society, 1355 Market St., San Francisco, Calif.

LIKE A KNIFE WITHOUT A BLADE

Adequate wiring is the "cutting edge" of the entire electrical industry. It provides the facilities that our customers need to use the merchandise we have for sale. It opens the way to maximum use of modern electrical servants in the home, and maximum sales by electrical dealers, contractors, manufacturers and utilities.

With thousands of new homes now being constructed, it becomes increasingly important for us to make sure that **everyone** knows the importance of adequate wiring.

Join, or start, an adequate wiring campaign in your town. Write for free literature and information about ways and means to promote adequate wiring.

PACIFIC COAST ELECTRICAL BUREAU

601 WEST 5TH STREET, LOS ANGELES • 447 SUTTER STREET, SAN FRANCISCO

CERTIFIED ADEQUATE RED SEAL STANDARD WIRING

7-41